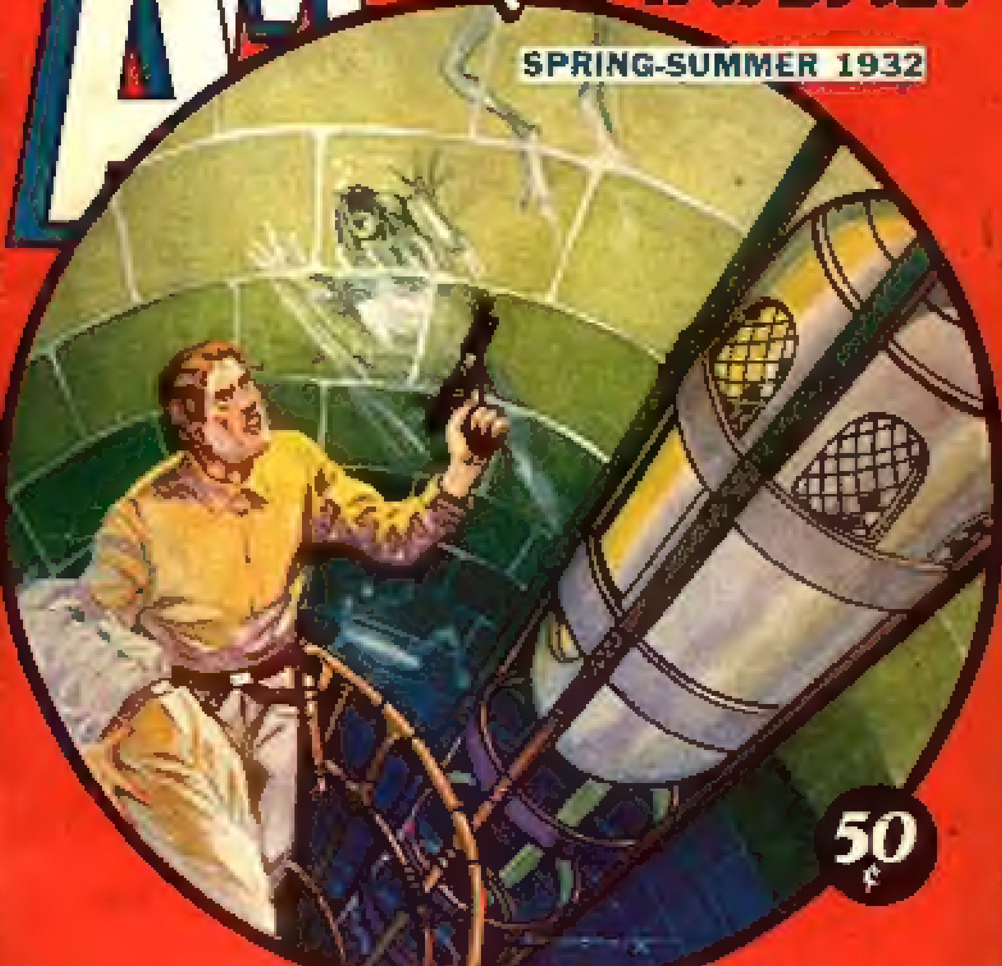
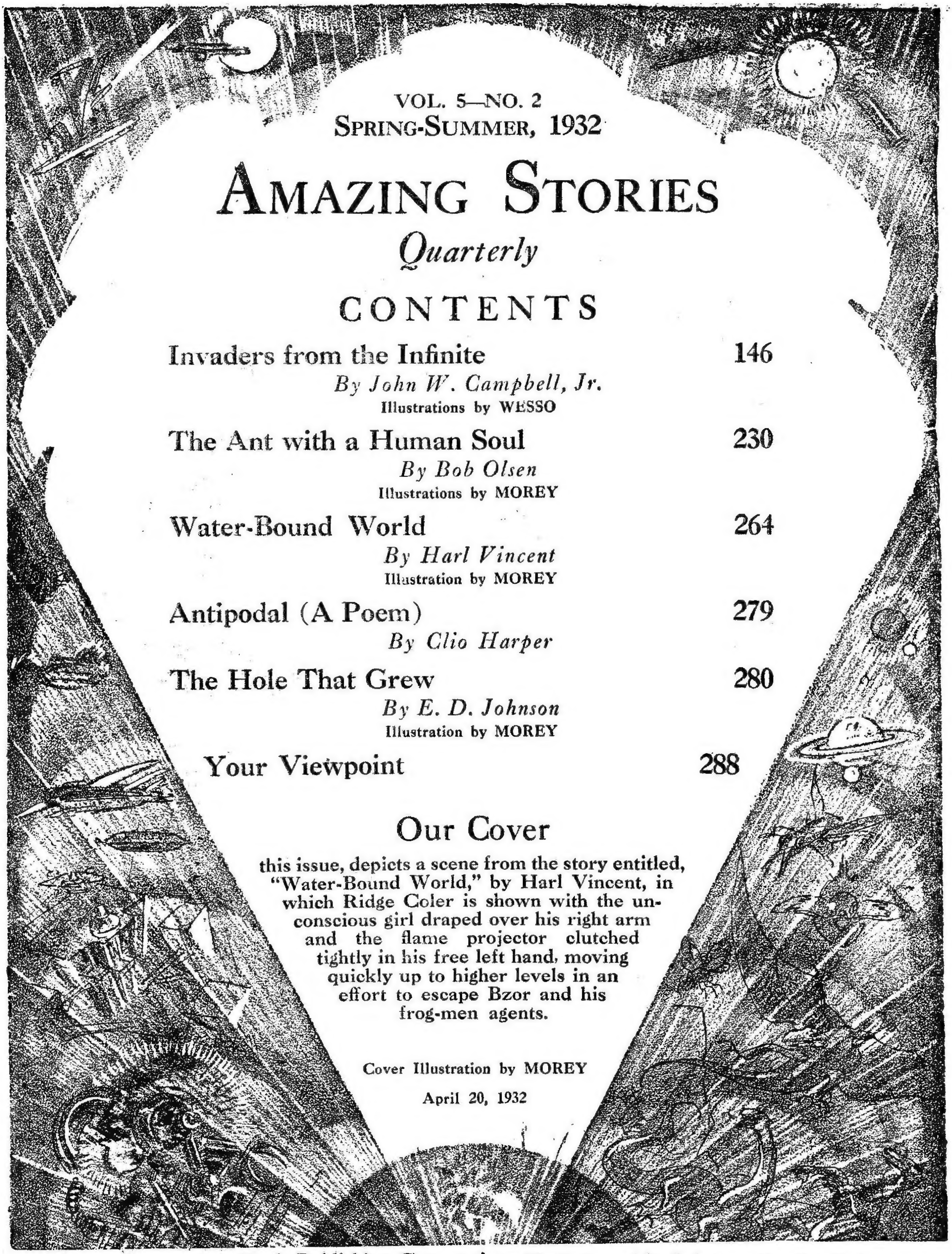
AMAZING STORIES QUARTERLY

SPRING-SUMMER 1932



Scientific Fiction by:

John W. Campbell, Jr. **Bob Olsen** **Harl Vincent**



VOL. 5—NO. 2
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AMAZING STORIES
Quarterly

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Our Cover

this issue, depicts a scene from the story entitled, "Water-Bound World," by Harl Vincent, in which Ridge Coler is shown with the unconscious girl draped over his right arm and the flame projector clutched tightly in his free left hand, moving quickly up to higher levels in an effort to escape Bzor and his frog-men agents.

Cover Illustration by MOREY

April 20, 1932

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Invaders from the Infinite

By John W. Campbell, Jr.

Author of "Solarite," "The Black Star Passes," etc.

ONCE more our famous trio of scientists, Arcot, Wade and Morey, are off in interplanetary space—this time with improvements for such travel even beyond their previous hopes. And it is while they are within their own universe that a warning and a plea for help against inimical enemies comes to them from inhabitants of far-away strange worlds. There is plenty of science, adventure, thrill and excitement in this last novel-length interplanetary story by one of our masters of scientific fiction. It is provocative of thought and is thoroughly entertaining.

Illustrated by WESSO

CHAPTER I

Invaders

RUSS EVANS, Pilot 3497, Rocket Squad Patrol 34, unsnapped the belt that had held him to his seat in the weightless ship, and with a slight push floated up into the air of the room. He stretched himself, and yawned broadly.

"Red, how soon do we eat?" he called.

"Shut up, you'll wake the other fellows, you nut. It's hard enough getting to sleep without being waked up," replied a low voice from the rear of the little, swift patrol ship. "See anything?"

"Yes, several million stars," replied Evans in a lower voice, rather disgustedly. "And," his tone becoming suddenly severe, "Assistant Murphy, remember your manners when talking to your superior officer. I've a mind to report you."

A flaming head of hair topping a grinning face poked around the edge of the door. "Lower your wavelength, lower your wavelength! You may think you're a sun, but you're just a planetoid. But what I'd like to know, Chief Pilot, Russ Evans, is why they locate a ship in a forlorn, out of the way place like this. Three-quarters of a billion miles out of the planetary plane. No ships ever come out here, no pirates, not a chance to help a wrecked ship. All we can do is sit here and watch the other fellows do the work."

"Which is exactly why we're here. Watch—and tell the other ships where to go, and when. Is that chow ready?" asked Russ looking at a small clock giving New York time.

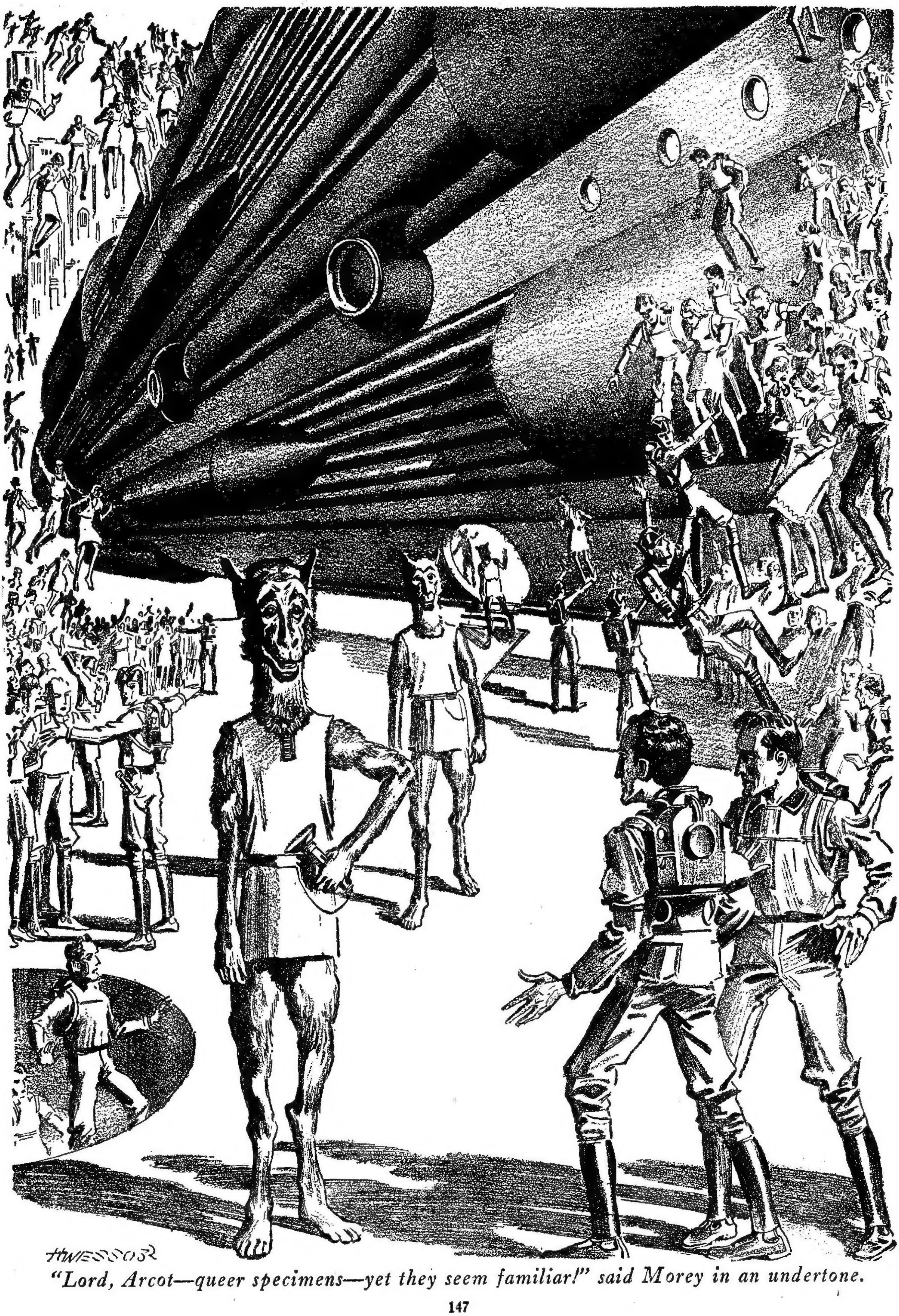
"Uh—think she'll be on time? Come on an' eat."

Evans took one more look at the telectroscope screen, then snapped it off. A tiny, molecular motion, towing unit in his hand, he pointed toward the door to the combined galley and lunch room, and glided in the wake of Murphy.

"How much fuel left?" he asked, as he glided into the dizzily spinning room. A cylindrical room, spinning at high speed, causing an artificial "weight" for the foods and materials in it, made eating of food a less difficult task. Expertly, he maneuvered himself to the guide rail near the center of the room, and caught the spiral. Braking himself into motion, he soon glided down its length, and landed on his feet. He bent and flexed his muscles, waiting for the now-busied assistant to get to the floor and reply.

"They gave us two pounds extra. Lord only knows why. Must expect us to clean up on some fleet. That makes four pound rolls left, untouched, and two thirds of the original pound. We've been here fifteen days, and have six more to go. The main driving power rolls have about the same amount left, and three pound rolls in each reserve bin," replied Red, holding a curiously moving coffee pot that strove to adjust itself to rapidly changing air velocities as it neared the center of the room.

"Sounds like a fleet's power stock. Martian lead or the terrestrial isotope?" asked Evans, tasting warily a


H.W.Wessolowski

"Lord, Arcot—queer specimens—yet they seem familiar!" said Morey in an undertone.

peculiar dish before him. "Say, this is energy food. I thought we didn't get any more till Saturday." The change from the energy-less, flavored pastes that made up the principal bulk of a space-pilot's diet, to prevent over-eating, when no energy was used in walking in the weightless ship, was indeed a welcome change.

"Uh-hu. I got hungry. Any objections?" grinned the Irishman.

"None!" replied Evans fervently, pitching in with a will.

SEATED at the controls once more, he snapped the little switch that caused the screen to glow with flashing, swirling colors as the teletroscope apparatus came to life. A thousand tiny points of flame appeared scattered on a black field with a suddenness that made them seem to snap suddenly into being. Points, tiny dimensionless points of light, save one, a tiny disc of blue-white flame, old Sol from a distance of close to one billion miles, and under slight reverse magnification. The skilful hands at the controls were turning adjustments now, and that disc of flame seemed to leap toward him with a hundred light-speeds, growing to a disc as large as a dime in an instant, while the myriad points of the stars seemed to scatter like frightened chickens, fleeing from the growing sun, out of the screen. Other points, heretofore invisible, appeared, grew, and rushed away.

The sun shifted from the center of the screen, and a smaller reddish-green disc came into view—a planet, its atmosphere coloring the light that left it toward the red. It rushed nearer, grew larger. Earth spread as it took the center of the screen. A world, a portion of a world, a continent, a fragment of a continent as the magnification increased, boundlessly it seemed.

Finally, New York spread across the screen; New York seen from the air, with a strange lack of perspective. The buildings did not seem all to slant toward some point, but to stand vertical, for, from a distance of a billion miles, the vision lines were practically parallel. Titanic shafts of glowing color in the early summer sun appeared; the hot rays from the sun, now only 82,500,000 miles away, shimmering on the colored metal walls.

The new Airlines Building, a mile and a half high, supported at various points by actual space-ship driving units, was a riot of shifting, rainbow hues. A new trick in construction had been used here, and Evans smiled at it. Arcot, inventor of the ship that carried him, had suggested it to Fuller, designer of that ship, and of that building. The colored berylium metal of the wall had been ruled with 20,000 lines to the inch, mere scratches, but nevertheless a diffraction grating. The result was amazingly beautiful. The sunlight, split up to its rainbow colors, was reflected in millions of shifting tints.

In the air, supported by tiny packs strapped to their backs, thousands of people were moving, floating where they wished, in any direction, at any elevation. There were none of the helicopters of even five years ago, now. A molecular power suit was far more convenient, cost nothing to operate, and but $50 to buy. Perfectly safe, requiring no skill, every one owned them. To the watcher in space, they were mere moving, snaky lines of barely distinguishable dots that shivered and seemed to writhe in the refractions of the air. Passing over them, seeming to pass almost through them in this strange perspectiveless view from infinite altitude, were the shadowy forms of giant space liners, titanic streamlined hulls. They were streamlined for no good reason, save that they looked faster and more graceful than the more efficient spherical freighters, just as passenger liners of two centuries earlier, with their steam engines, had carried four funnels and used two. Four made it appear more powerful. A space liner spent so minute a portion of its journey in the atmosphere that it was really inefficient to streamline them.

"Won't be long!" muttered Russ, grinning cheerily at the familiar, sunlight city. His eyes darted to the chronometer beside him. The view seemed to be taken from a ship that was suddenly scudding across the heavens like a frightened thing, as it ran across from Manhattan Island, followed the Hudson for a short way, then cut across into New Jersey, swinging over the great woodland area of Kittatiny Park, resting finally on the New Jersey suburb of New York nestled in the Kittatinies, Blairtown. Low apartment buildings, ten or twelve stories high, nestled in the waving green of trees in the old roadways. When ground traffic ceased, the streets had been torn up, and parkways substituted.

Quickly the view singled out a single apartment, and the great smooth roof was enlarged on the screen to the absolute maximum clarity, till further magnification simply resulted in worse stratospheric distortion. On the broad roof were white strips of some material, making a huge V followed by two I's. Russ watched, his hand on the control steadying the view under the Earth's complicated orbital motion, and rotation, further corrections for the ship's orbital motion making the job one requiring great skill. The view held the center with amazing clarity. Something seemed to be happening to the last of the I's. It crumpled suddenly, rolled in on itself and disappeared.

"She's there, and on time," grinned Russ happily.

He tried more magnification. Could he——.

He was tired, terribly, suddenly tired. He took his hands from the viewplate controls, relaxed, and dropped off to sleep.

"What made me so tired—wonder—GOD!" He straightened with a jerk, and his hands flew to the controls. "Red!" he shouted. The view on the machine suddenly retreated, flew back with a velocity inconceivable. Earth dropped away from the ship with an apparent velocity a thousand times that of light; it was a tiny ball, a pinpoint, gone, the sun—a minute disc—gone—then the apparatus was flashing views into focus from the other side of the ship. The assistant did not reply. Evans' hands were growing ineffably heavy, his whole body yearned for sleep. Slowly, clumsily he pawed for a little stud. Somehow his hand found it, and the ship reeled suddenly, little jerks, as the code message was flung out in a beam of such tremendous power that the sheer radiation pressure made it noticeable. Earth would be notified. The system would be warned. But light, slow crawling thing, would take hours to cross the gulf of space, and radio travels no faster.

Half conscious, fighting for his faculties with all his will, the pilot turned to the screen. A ship! A strange, glistening thing streamlined to the nth degree, every spare corner rounded till the resistance was at the irreducible minimum. But, in the great pilot-port of the stranger, the patrol pilot saw faces, and gasped in surprise as he saw them! Terrible faces, blotched, contorted. Patches of white skin, patches of brown, patches of black, blotched and twisted across the faces. Long, lean faces, great wide flat foreheads above, skulls strangely squared, more box-like than man's rounded skull. The ears were large, pointed tips at the top. Their hair was a silky mane that extended low over the forehead, and ran back, spreading above the ears, and down the neck.

Then, as that emotion of surprise and astonishment weakened his will for the moment, oblivion came, with what seemed a fleeting instant of memories. His life seemed to flash before his mind in serried rank, a file of events, his childhood, his life, his marriage, his wife, an image of smiling comfort, then the years, images of great and near great men, his knowledge of history, pictures of the great war of 2074, pictures of the attackers of the Black Star—then calm oblivion, quiet blankness.

The long, silent ship that had hovered near him turned, and pointed toward the pinhead of matter that glowed brilliantly in the flaming jewel box of the heavens. It was gone in an instant, rushing toward Sun and Earth at a speed that outraced the flying radio message, leaving the ship of the Guard Patrol behind, and leaving the Pilot as he leaves our story.

CHAPTER II

Canine People

"AND that," said Arcot between puffs, "will certainly be a great boon to the Rocket Patrol, you must admit. They don't like dueling with these space-pirates using the molecular rays, and since molecular rays have such a tremendous commercial value, we can't prohibit the sale of ray apparatus. Now, if you will come into the 'workshop,' Fuller, I'll give a demonstration with friend Morey's help."

The four friends rose, Morey, Wade and Fuller following Arcot into his laboratory on the thirty-seventh floor of the Arcot Research Building. As they went, Arcot explained to Fuller the results and principles of the latest product of the ingenuity of the "Triumvirate," as Arcot, Morey and Wade had come to be called in the news dispatches.

"As you know, the molecular rays are rays of a frequency between the shortest radio and the longest, so called heat ray or infra-reds. Their range is narrow, and they must be used and mixed correctly to have the desired effect; making all the molecules of any piece of matter they are turned upon move in the desired direction. Since they supply no new energy, but make the body they are turned upon supply its own, or better, use the energy of its own random molecular motion of heat, it was practically impossible to stop it. The energy necessary for molecular rays to take effect is so small that the usual type of filter lets enough of it pass, and the attacked ship was no better off than before; the rays simply drove the front end into the rear, or *vice versa,* or tore it to pieces as the pirates desired. The Rocket Patrol could kill off the pirates, but they lost so many men in the process, it was a Phyrric victory.

"For some time Morey and I have been working on something to stop the rays. Obviously it can't be by means of any of the usual metallic energy absorption screens.

"We finally found a combination of rays, better frequencies, that did what we wanted. I have such an apparatus here. What we want you to do, of course, is the usual job of re-arranging the stuff so that the apparatus can be made from dies, and put into quantity production. As the Official Designer for the A.A.L. you ought to do that easily." Arcot grinned as Fuller looked in amazement at the apparatus Arcot had picked up from the bench in the "workshop."

"Don't get worried," laughed Morey, "that's got a lifting unit combined—just a plain ordinary molecular lift such as you see by the hundreds out there." Morey pointed through the great window where thousands of those lift units were carrying men, women and children through the air, lifting them hundreds, thousands of feet above the streets and through the doors of buildings.

"Here's an ordinary molecular pistol; you've used them before. Try this one if you want to, and then use it when I say ready. I'm going to put the suit on, and rise about five feet off the floor. You can turn the pistol on me, and see what impression it makes on the suit."

Fuller took the molecular ray pistol, while Wade helped Arcot into the suit. He looked at the pistol dubiously, pointed it at a heavy casting of iron resting in one corner of the room, and turned the ray at low concentration, then pressed the trigger-button. The casting gave out a low, scrunching grind, and slid toward him with a lurch. Instantly he shut off the power. "This isn't any ordinary pistol. It's got seven or eight times the ordinary power!" he exclaimed.

"Oh yes, I forgot," Morey turned to him, and took it from him. "Instead of the fuel battery that the early pistols used, this has a space-distortion power coil. This pistol has as much power as the usual A-39 power unit for commercial work. Arcot used that pistol to show you the power of the suit."

By the time Morey had explained the changes to Fuller, Arcot had the suit on, and was floating five or six feet in the air, like a grotesque captive balloon. "Ready, Fuller?"

"I guess so, but I certainly hope that suit is all it is claimed to be. If it isn't—well I'd rather not commit murder. All the people in the system would be howling for my corpse if I murdered the man who gave them unlimited energy and unlimited mobility!"

"It'll work," said Arcot, a slow smile on his face. "I'll bet my neck on that!" Suddenly he was surrounded by the faintest of auras, a strange, wavering blue light, like the hazy corona about a 400,000-volt power line. "Now try it."

Fuller pointed the pistol at the floating man and pushed the trigger. The brilliant blue beam of the molecular ray, and the low hum of the air, rushing in the path of the director beam, stabbed out toward Arcot. The faint aura about him was suddenly intensified a million times till he floated in a ball of blue-white fire. Scarcely visible, the air about him blazed with bluish incandescence of ionization.

"Increase the power," suggested Morey. Fuller turned on more power. The blue halo was shot through with tiny violet sparks, the sharp odor of ozone in the air was stifling; the heat of wasted energy was making the room hotter. The power increased further, and the tiny sparks were waving streamers, that laced across the surface of the blue fire. Little jets of electric flame reached out along the beam of the ray now. Finally, as full power of the molecular ray was reached, the entire halo was buried under a mass of writhing sparks that seemed to leap up into the air above the man's head, wavering up to extinction. The room was unbearably hot, despite the molecular ray coolers absorbing the heat of the air, and blowing cooled air into the room.

Fuller snapped off the ray, and put the pistol on the table beside him. The halo died, and went out a moment later, and Arcot settled to the floor.

"This particular suit will stand up against anything the ordinary commercial sets will give. The system now: remember that the rays are short electrical waves. The easiest way to stop them is to interpose a wave of opposite phase, and cause interference. Fine, but try to get in tune with an unknown wave when it is moving in relation to your center of control. It is impossible to do it before you yourself have been rayed out of existence. We must use some system that will automatically, instantly be out of phase.

"The Hall effect would naturally tend to make the frequency of a wave through a resisting medium change, and lengthen. If we can send out a spherical wave front, and have it lengthen rapidly as it proceeds, we will have a wave-front that is, at all points, different. Any entering wave would, sooner or later, meet a wave that was half a phase out, no matter what the motion was, nor what the frequency, as long as it lies within the comparatively narrow molecular wave band. What this apparatus, or ray screen, consists of, is a machine generating a spherical wave front of the nature of a molecular wave, but of just too great a frequency to do anything. A second part generates a condition in space, which opposes that wave. After traveling a certain distance, the wave has lengthened to molecular wave type, but is now beyond the machine which generated it, and no longer affects it, or damages it. However, as it proceeds, it continues to lengthen, till eventually it reaches the length of infra-light, when the air quickly absorbs it, as it reaches one of the absorption bands for air molecules. But, in the meantime, it has run the entire gamut of molecular waves, and any molecular wave must find its half-wave complement somewhere in that wedge of waves. It does, and is at once choked off, its energy fighting the energy of the ray screen, of course. In the air, however, the screen is greatly helped by the fact that before the half-wave frequency is met in the ray-wedge, the molecular ray meets a wave that makes it ionize the air, and most of the molecular ray is buried in ions, leaving the ray screen little work to do.

"Now your job is to design the apparatus in a form that machines can make automatically. We tried doing it ourselves for the fun of it, but we couldn't see how we could make a machine that didn't need at least two humans to supervise."

"Well," grinned Fuller, "you have it all over me as scientists, but as economic workers—two human supervisors to make one product!"

"All right—we agree. But no, let's see you—Lord! What was that?" Morey started for the door on the run. The building was still trembling from the shock of a heavy blow, a blow that seemed much as though a machine had been wrecked on the armoured roof, and a big machine at that. Arcot, a flying suit already on, was was up in the air, and darting past Morey in an instant, streaking for the vertical shaft that would let him out to the roof. The molecular ray pistol was already in his hand, ready to pull any beams off unfortunate victims pinned under them.

IN a moment he had flashed up through the seven stories, and out to the roof. A gigantic silvery machine rested there, a huge, tapering machine, streamlined to perfection, its rounded fluted hull dazzlingly beautiful in the sunlight. A door opened, and three tall, lean men stepped from it. Already a crowd of people were collecting about the ship, flying up from below. The three men blinked in the bright sunlight, gazing in amazement at the men floating in the air, calling to each other. Air patrolmen floated up in a minute, and seeing Arcot, held the crowd back.

The strange ship proclaimed in an instant that this was no ship of the system, and the strange men told the same story. They were tall, eight feet or more in height. Great, round, soft brown eyes looked in bewildered curiosity at the towering multicolored buildings, at the people floating in the air, at the green trees and the blue sky, the yellowish sun.

Arcot looked at them, at their strangely blotched and mottled head and face, their arms and hands. Their feet were very long and narrow, their legs long and thin. Their faces were kindly, but bewildered now, the mottled skin, brown and white and black, seemed not to make them ugly. It was not a disfigurement; it seemed oddly familiar and natural; the pointed ears, too, seemed familiar in some reminiscent way.

Suddenly Morey was beside Arcot, and a moment later Fuller and Wade joined him, their flying suits on at last.

"Lord, Arcot—queer specimens, yet they seem familiar!" said Morey in an undertone.

"Oh—no wonder! They are. Their race is that of man's first and best friend, the dog! These are canine people! See the typical brown eyes? The typical teeth, their feet now flat on the ground, still show the traces of the dog's toe-step. Their nails, not flat like human ones, but rounded? The mottled skin, the ears—look, one is advancing." Arcot spoke hurriedly.

One of the strangers walked laboriously forward. A lighter world than Earth was evidently his home. His great brown eyes fixed themselves on Arcot's. Arcot watched them. They seemed to expand, grow larger; they seemed to fill all the sky. Arcot was curious; why was this, and why was this feeling of content.

Suddenly realization came. Hypnotism! He concentrated his mind trained by Venerian masters, and the eyes suddenly contracted to the normal eyes of the stranger, shrank even more, the man reeled back, as Arcot's telepathic command to sleep came, stronger than his own will. The stranger's friends caught him, shook him, but he slept. One of the others looked at Arcot, his eyes seemed hurt, desperately pleading.

Arcot strode forward, and quickly brought the man out of the trance. He shook his head, smiled at Arcot, then, with desperate difficulty, he enunciated some words in English, terribly distorted.

"Ahy wizz tahk. Vokle kohds ron. Tahk by breen.*"

Puzzled, Arcot repeated the words to himself, turning to Morey for assistance in deciphering the meaning. Wade finally got it, and explained what they meant. Instantly Arcot turned to the speaker, and without hypnotism, communicated by the Venerian method, telepathically.

"Good enough. When you attempted to hypnotize me, I didn't know what you wanted, and knowing nothing of your mission, I naturally determined to overcome you. It is not necessary to hypnotize one to carry on communication by the method of the second world of this system. What brings you to our system? From what system do you come? What do you wish to say?"

The other, not having learned the Venerian system, had great difficulty in communicating his thoughts, but Arcot learned that they had machines which would make it easier, and the Terrestrian invited them into his laboratory, for the crowd was steadily growing.

The three returned to their ship for a moment, coming out with several peculiar headsets. Almost at once the ship started to rise, going up more and more swiftly, as the people cleared a way for it.

Then, in the tiniest fraction of a second, the ship was gone; it shrank to a point, and was invisible in the blue vault of the sky.

"Apparently they intend to stay a while," said Wade. "They are trusting souls, for their line of retreat is cut off. We naturally have no intention of harming them, but they can't know that."

"I'm not so sure," said Arcot. He turned to the apparent leader of the three men of another world, and explained briefly that there were several stories to descend, and stairs were harder than a flying unit. "Wrap your arms about my legs, when I rise above you, and hold on till your feet are on the floor again," he concluded.

The stranger walked a little closer to the edge of the rising shaft, and looked down. White bulbs illuminated its walls down its length to the ground. The man talked rapidly to his friends, looking with evident distaste at the shaft, and the tiny pack on Arcot's back. Finally, shaking his shoulders a little, and smiling, he evinced his willingness. Arcot rose, the man grasped his legs, and then both rose. Over the shaft, and down to his laboratory was the work of a moment. Morey and Wade followed immediately with the other two, Fuller coming down just behind them. In common with most people unfamiliar with the operation of the molecular lift-suits who are thus given a lift, the three dropped when they came within a foot or so of the floor, with the natural result that the terrestrians, who had carried them, had about two hundred and fifty pounds excess lift, and fell heavily to the ceiling. However, as Arcot had expected it, he had warned the others, and no heads were bumped. An inverted fall can be a mean thing. The head and neck practically always get the full force of the blow, which may be several times heavier than a fall under gravity, for the acceleration produced by a molecular lift is easily greater than *g*.

---

*"I wish (to) talk. Vocal cords wrong. Talk by brain."

ARCOT lead them into his "consultation room," where a number of comfortable chairs were arranged, facing each other. He seated them together, and his own friends facing them. He left the room, explaining that he was going to call his father.

In less than three minutes both were back, Arcot junior having already explained as much as he knew of his guests.

"Friends of another world," began Arcot, Jr., when they were finally seated, "we do not know your errand here, but you evidently have good reason for coming to this place. It is unlikely that your landing was the result of sheer chance. What brought you? How came you to this point?"

"It is difficult for me to reply. First we must be *en rapport*. Our system is not simple as yours, but more effective, for yours depends on thought ideas, not altogether universal. Place these on your heads, for only a moment. I must induce temporary hypnotic coma. Let one try first if you desire." The leader of the visitors held out one of the several headsets they had brought, caplike things, made of laminated metal apparently.

Arcot took it, and was ready to slip it on, when his father stopped him. "They may mean well, and yet it may turn out that what is their meat is our poison. That may ruin your mind. Don't."

Arcot hesitated, then with a grin slipped it on. "I think they are friends, and I think they know what they are talking about."

"Relax," came a voice in Arcot's head, a low, droning voice, a voice of command. "Sleep," it added. Arcot felt himself floating down an infinite shaft, on some superflying suit that did not pull at him with its straps, Just floating down lightly, down and down and down. Suddenly he reached the bottom, and found to his surprise that it led directly into the room again! He was back. "You are awake. Speak!" came the voice.

Arcot shook himself, and looked about. A new voice spoke now, not the tonelessly melodious voice, but the voice of an individual, yet a mental voice. It was perfectly clear, and perfectly comprehensible. "We have traveled far to find you, and now we have business of the utmost import. Ask these others to let us treat them, for we must do what we can in the least possible time. I will explain when all can understand. I am Zezdon Fentes, First Student of Thought. He who sits on my right is Zezdon Afthen, and he beyond him, is Zezdon Inthel, of Physics and of Chemistry, respectively."

And now Arcot spoke to his friends.

"These men have something of the greatest importance to tell us, it seems. They want us all to hear, and they are in a hurry. The treatment isn't at all annoying. Try it. The man on the extreme right, as we face them, is Zezdon Fentes of Thought, Zezdon apparently meaning something like professor, or 'First Student of.' Those next him are Zezdon Afthen of Physics and Zezdon Inthel of Chemistry."

Zezdon Afthen offered them the headsets, and in a moment everyone present was wearing one. The process of putting them *en rapport* took very little time, and shortly all were able to communicate with ease.

"Friends of Earth, we must tell our strange story quickly for the benefit of your world as well as of ours, and others, too. We bring news of a menace of cosmic proportions of an enemy that we cannot so much as annoy. We are helpless to combat them.

"Our world lies far out across the galaxy. It is the planet of a sun somewhat larger than yours, but our scientists have for many years observed your sun with great interest, longing always to reach it and investigate it—for we are your twin! Our race lives on a world that owes its existence to your sun, as your planet owes its being to our sun! Our two suns passed each other at close range in the ages long, long passed, and they drew—but I see that you know the story of the formation of planets from suns. At any rate, our worlds are twins. The outer worlds of our system show chemical substances not found on the inner worlds, for the planetary filament was mixed, the substance of the two suns joining and forming the great filament. Always your sun has been of interest to us, and to the Ancient Masters before us. The Ancient Masters learned the secret of space travel, but never could they make a machine capable of traversing the 250,000 light years that separate the worlds once so close—many times in the ages past so close. In another hundred million years perhaps—then we will be next door neighbors. But even with incalculable velocity of the great swift thing that bore us, three long months have we traveled toward your distant worlds, hoping against hope that we would find the aid we needed, hoping that at last the Invaders might meet their masters.

"We landed on this roof, Arcot, because we examined mentally the knowledge of a pilot of one of your patrol ships. His mind told us that here we would find the three greatest students of Science of this Solar System. So it was here we came for help," explained Zezdon Afthen in reply to Arcot's previous question.

"Our race has arisen," he continued, "as you have so surely determined, from the race you call canines. It was artificially produced by the Ancient Masters when their hour of need had come. We have lost the great science of the Ancient Ones. But we have developed a different science, a science of the mind."

"Dogs are far more psychic than are men. They would naturally tend to develop such a civilization," said Arcot senior judiciously.

CHAPTER III

A Quarter of a Million Light Years

"OUR civilization," continued Zezdon Afthen, "is built largely on the knowledge of the mind. We cannot have criminals, as your world unfortunately has, for the man who plots evil, is surely found out by his thoughts. We cannot have lying politicians and unjust rulers. Our government must be just and honest, and there can be no wars.

"It is a peaceful civilization. The Ancient Masters feared and hated War with a mighty aversion. But they did not make our race cowards, merely peaceful intelligence. Now we must fight for our homes, and my race will fight mightily. But we need weapons.

"But my story has little to do with our race. I will tell the story of our civilization and of the Ancient Ones later when the time is more auspicious.

"Four months ago, our mental vibration instruments detected powerful emanations from space. That could only mean that a new, highly intelligent race had suddenly appeared within a billion miles of our world. The directional activity-locating devices quickly spotted it as emanating from the third, and largest planet of our system. Zezdon Fentes, with my aid, set up some special apparatus, and invented the greatest wonder our world has known. He has discovered a way of so hetrodyning a thought vibration of the order of the—. But you do not know all of thought. Never mind that. But he invented a machine that makes thought visible.

"With it we could ses not only what the enemy looked upon, but what he saw in that curious thing, the eye of the mind, the vision of the past and the future. It was an immense labor, possible only because the men stayed on that world for a long time. But finally it was finished. We had a machine which would pick up strong thoughts and make them visible. You who know so little of thought and so much of the forces of space cannot appreciate what it was. But it was a wonder to us. We had thought-amplification devices, and we could pick up those distant thoughts. We could have made them visible, those thought of those men, if only we could get them separated.

"It was done finally, when all but one man slept. That one we were enabled to tune sharply to. After that we could reach him at any time. He was the commander. We saw him operate the ship, we saw the ship, saw it glide over the barren, rocky surface of that world. We saw other men come in and go out. They were strange men. Short, squat, bulky men, Their arms were short and stocky. But their strength was enormous, unbelievable. We saw them bend solid bars of steel as thick as my arm, with perfect ease!

"Their brains were tremendously active, but they were evil, selfishly evil. Nothing that did not benefit them counted. At one time our instruments went dead, and we feared that the commander had detected us, but we saw what happened a little later. The second in command had killed him, blasting a little hole, the diameter of a pencil of your world, through his head. A ray—some shining bright ray that I cannot understand.

"We saw them examine the world, working their way across it, wearing heavy suits, yet, for all the terrific gravity of that world, bouncing about like rubber balls, leaping and jumping where they wanted. Their legs would drive out like pistons, and they soared up and through the air.

"They were tired while they made those examinations, and slept heavily at night. There was little thought, save of the morrow.

"Then one night there was a conference. We saw then what they intended. Before we had tried desperately to signal them. Now we were glad that we had failed.

"We saw their ship rise (in the thoughts of the second in command) and sail out into space, and rush toward our world. The world grew larger, but it was only dimly, imperfectly sketched in, for they did not know our world well. Their telescopes did not have great power as your electric telescopes have.

"We saw them investigate the planet, but there were no people. Then there were people on it, and they destroyed the people with either a ray which was as follows: 'the ray which makes all parts move as one,' or another which was: 'the ray which is light of very great brightness or speed of rotation.' We could not understand and could not interpret. Thoughts beyond our knowledge have, of course, no meaning, even when our mental amplifiers get them, and bring them to us."

"The Molecular ray and the Cosmic Ray!" gasped Morey in surprise. "They will be an enemy."

"You know it! It is familiar to you! You have it? You can fight it?" asked Zezdon Afthen excitedly.

"We know it, and can fight it, if that is all they have."

"They have more—much more I fear," replied Zezdon Afthen hopelessly. "At any rate, we saw what they intended. If our world was inhabited, they would destroy every one on it, and then, from somewhere across the void, other men of their race were to float in on their great ships, and settle on that largest of our worlds.

"We had to stop them, so we did what we could. We had powerful machines, which would amplify and broadcast our thoughts. That seemed the only way we could get them in our power. Certainly, as they came near our world, they would see our cities and become careful, perhaps not land at any point. So we broadcast our thought-waves, and implanted in the mind of their leader that it would be wise to land, even if the world were inhabited, and learn the extent of the civilization, and the weapons to be met. Also, as the ship drew nearer, we made him decide on a certain spot we had prepared for him.

"He never guessed that the thoughts were not his own. Only the ideas came to him, seeming to spring from his own mind. Thought is a mysterious thing, and only the greatest experts can determine successfully whether their thoughts are their own, or ideas supplied by others. He never guessed it.

"HE landed—and we used our one weapon. It was a thing left to one group of rulers when the Ancient Masters left us to care for ourselves. What it was, we never knew; we had never used it in the fifteen thousand years since the Great Masters had passed—never had to. But now it was brought out, and concealed behind great churned piles of rock in a deep cañon, where the ship of the enemy would land soon. When it landed, we turned the strange beam of the machine on it, and the apparatus rotated it swiftly, and a cone of the beam's ray was formed as the beam was swung through a small circle in the vertical plane. The machine leaped backwards, and though it was so massive that a tremendous amount of labor had been required to bring it there, the push of the pencil of force we sent out hurled it back against a rocky cliff behind it as though it were some child's toy. It continued to operate for perhaps a second, perhaps two. In that time two great holes had been cut in the enemy ship, holes fifteen feet across, that ran completely through the hull, as though a die had cut through the metal of the ship, cutting out a disc of metal.

"There was a terrific concussion, and a roar as the air blasted out of the ship. The huge discs of metal were hurled across the cañon by the escaping air, and struck the wall with terrific force, splintering the solid rock to sand, yet not so much as scratching those glass-like discs.

"Relux-coated lux I should say, eh Arcot?" muttered Morey.

"Probably. Go on Zezdon Afthen."

"You know of that, too?" Zezdon asked, eagerly glad of their knowledge.

"To continue; the material we did not know, but it did not take us long to discover that the enemy were dead. Their terrible, bloated corpses lay everywhere in the ship. Most of the men we were able to recognize, having seen them in the mentovisor. But the colors were distorted, and their forms were peculiar. Indeed, the whole ship seemed strange. There was a weird unreality about it, an impression I could not understand. The only time that things ever did seem normal about that strange thing, when the angles of it seemed what they were, when the machines did not seem out of proportion, out of shape, twisted, was when on a trial trip we ventured very close to our sun."

Arcot whistled softly and looked at Morey. Morey nodded. "Probably right. Don't interrupt."

"That you thought something, I understood, but the thoughts themselves were hopelessly unintelligible to me. You know the explanation?" asked Zezdon Afthen eagerly.

"We think so. The ship, which you captured, was evidently made on a world of huge size. Those men, their stocky, block legs and arms, their entire build and their desire for the largest of your planets, would indicate that. Their own world was probably even larger—they were forced to wear pressure suits even on that large world, and could jump all over, you said. On so huge a sphere as their native world seems to be, the gravity would be so intense as to distort space. Geometry, such as yours seems to be, and such as ours was, could never be developed, for you assume the existence of a straight line, and of an absolute plane surface. These things cannot exist in space, but on small worlds, far from the central sun's mass, the conditions approach that without sufficient discrepency to make the error obvious. On so huge a globe as their world, perhaps as large as our sun, the space is so curved that it is at once obvious that no straight line exists, and that no plane exists. Their geometry would never be like ours, nor like yours. When you went close to your sun, the attraction was sufficient to curve space into a semblance of the natural conditions on their home planet, then your senses and the ship met a compromise condition which made it seem more or less normal, not so obviously strange to you.

"But continue," Arcot looked at Afthen interestedly.

"There were none left in their ship now, and we had been careful in locating the first hole, that it should not damage the propulsive machinery. The second hole was accidental, due to the shift of the machine. The machine itself was wrecked now, for it had been crushed by its own reaction. We forgot that any pencil of force powerful enough to do what we wanted, would tear the machine from its moorings unless fastened with great steel bolts into the solid rock.

"The second hole had been far to the rear, and had, by ill-luck, cut out a portion of the driving apparatus. It was, to us, irreplaceable. We could not repair that, though we did succeed at last in lifting the great discs into place. We attempted to cut them, and put them back in sections. Our finest saws and machines did not nick them. Their weight was unbelievable, and yet we finally, with terrible labor in that forsaken place, for from machine shops, succeeded in lifting the things into the wall of the ship. The actual missing material did not represent more than a tiny cut, perhaps as wide as one of your credit-discs. You could slip a thin piece of metal in between them, but not so much as your finger.

"Those slots we welded tight with our best steel, letting a flap hang over on each side of the cut, and as the hot metal cooled, it was drawn against the shining walls with terrific force. A softer metal with a higher melting point had been put in first, and this yielded under the pressure, and flowed into the slight holes like a grommat. The joints were perfectly airtight.

"The machines proper were repaired to the greatest possible extent. It was a heart-breaking task, for we must only guess at what machines should be connected together. Much damage had been done by the rushing air as it left, for it filled the machines, too, and they were not designed to resist the terrific air presure that was on them when the pressure in the ship escaped. Many of the machines had been burst open, and these we could repair when we had the necessary elements and knew their construction from the remnants, or could find unbroken duplicates in the stock rooms.

"Once we connected the wrong things. This will show you what we dealt with. They were the wrong poles—two generators, connected together in the wrong way. There was a terrific crash when the switch was thrown, and huge sheets of electric flame lept from one of them. Two men were killed, incinerated in an instant, even the odors one might expect were killed in that flash of heat. Everything save the shining metal and clear glass within ten feet of it was instantly wiped out. And there was a fuse link that gave. The generator was ruined. One was left, and several small auxiliary generators.

"Eventually, the Lord of Space alone knows how, we did the job. We made the machine work. And we are here."

Zedzon Afthen paused; he looked tired now.

"I will continue," said Zezdon Fentes. "We have come to warn you, and to ask aid. You can see that we need aid. But now the warning to you. Your system also has a large planet, slightly smaller than the largest of our system, but yet attractive. There are approximately 50,000 planetary systems in this universe, according to the records of the Invaders. Their world is not of this system. It is the World Thett, sun Antseck, Universe Venone. Where that is, or even what it means, we do not know. Perhaps you understand.

"But they investigated your world, and its address, according to their records, was World 3769-8482730-3. This, I believe, means, Universe 3769, sun 8482730, world 3. They have been investigating this system now for nearly three centuries. It was close to 200 years ago that they visited your world—two hundred years of your time."

"This is 2129—which makes it about the year 1929-30 that they floated around here investigating. Why haven't they done anything?" Arcot asked him.

"They waited for an auspicious time. They are waiting for some weapon. They are afraid now, for recently they visited your world, and were utterly amazed to find the unbelievable progress your people have made. They intend to make an immediate attack on all worlds known to be intelligently populated. They had made the mistake of letting one race learn too much, they cannot afford to let it happen again.

"There are only twenty-one inhabited worlds known, and their thousands of scouts have already investigated nearly all the central mass of this universe, and much of the outer rings. They have established a base in this universe. Where I do not know. That, alone, was never mentioned in the records. But of all peoples, they feared only your world.

"There is one race in the universe far older than yours, but they are a sleeping people. Long ago their culture decayed. Still, now they are not far from you, and perhaps it would be worth the few days needed to learn more about them. We have their location and can take you there. Their world circles a dead star—"

"Not any more," laughed Morey grimly. "That's another surprise for our friends, the enemy. They had a little jog, and they certainly are wide awake now. They are headed for big things, and they are going to do a lot."

"BUT how do you know these things? You have ships that can go from planet to planet, I know, but the records of the enemy said you could not leave the system of your sun. They alone knew that secret."

"Another surprise for them. We can—and we can move faster than your ship, if not faster than they. The people of the dead star have moved to a very live star—Sirius, the brightest in our heavens. And they are as much alive now as their new sun. They can move faster than light, also. I don't know how, yet. We had a little misunderstanding a while back, when their star passed close to ours. They came off second best, and we haven't spoken to them since. But I think we can make valuable allies there.

"But continue," for all Morey's jocular manner, he realized the terrible import of this announcement. A race which had been able to cross the vast gulf of intergalactic space in the days when Terrestrians were still developing the airplane—it had just been invented then, back in 1930, and already they had mapped Jupiter, and planned their colonies! When the submarine was still an important instrument of war! What developments had come? They had molecular rays, cosmic rays, the energy of matter, then—what else had they now? Lux and Relux, the two artificial metals, made of solidified light, far stronger than anything of molecular structure in nature, absolutely infusible, totally inert chemically, one a perfect conductor of light and of all radiation in space, the other, from its very name, indicated a perfect reflector of all radiations—save molecular rays. Made into the condition of reflection by the action of special frequencies in its formation from light, molecular frequencies were, unfortunately, able to convert it into perfectly transparent lux metal, when the protective value was gone.

They had that. All Earth had, perhaps.

"There was one other race of some importance, the others were semi-civilized. They rated us in a position between these races and the high races—yours, those of the dead star, and those of world 3769-37:478:326:-894-6. Our science had been investigated during the time of—an ancient ruler. You had best merely know it as two hundred or so years ago.

"This other race was at a great distance from us, greater than yours, and apparently not feared as greatly as yours. They cannot cross to other worlds, save in small ships driven solely by fire, which the Thessians have called a 'hopelessly inefficient and laughably awkward thing to ride in.' "

"Rockets," grinned Morey. "Our first ship was part rocket."

Zezdon Fentes smiled. "But that is all. We have brought you warning, and our plea. Can you help us?" His thoughts were anxious for his people, as they came clearly to the men seated before him.

"We cannot answer that. The Interplanetary Council must act. But I am afraid that it will be all we can do to protect our own world if this enemy attacks soon, and I fear they will. Since they have a base in this universe, it is impossible to believe that all ships did not report back to the home world at stated intervals. That one is missing will soon be discovered, and it will be sought. War will start at once. Three months it took you to reach us—they should come soon. Three months those men who left will be on their way back to the home world from which they came—from your world. What do you call your planet, friend?"

"Ortol is our home," replied Zezdon Inthel.

"At any rate, I can only asure you that your world will be given weapons that will permit your people to defend themselves as well as our own people can defend themselves, and I will get you to your home within twenty-four hours. Your ship—is it in the system?"

"It waits on the second satellite of the fourth planet," replied Zezdon Afthen.

"Signal them, and request them to land where a beacon of intense light, alternating red and blue, reaches up from—this point on the map." Arcot pointed out the spot in Vermont where their private lake and laboratory were. Here the larger scale experiments were carried out. Here the first molecular motion ship of earth had been built. Here the *Solarite*, first of the interplanetary ships had been launched. Here the *Ancient Mariner*, the first intergalactic ship of Earth—of this universe—had been built.

"We will leave you now. No, come with us," Arcot turned to the others, and in rapid-fire English, he explained his plans.

"We need the help of these people as much as they need ours. Dad, you can better speak to the authorities. I think Zezdon Afthen—no better Zezdon Fentes—will stay here and help you. The others will go with us to their world. There we shall have plenty of work to do, but on the way we are going to stop at Mars and pick up that very valuable ship of theirs and make a very careful examination for possible new weapons, their system of speed-drive, and their regular space-drive, if it is not the same. I'm willing to make a bet right now, that I can guess both. Their regular drive is a molecular drive with lead disintegration apparatus for the energy; cosmic ray absorbers for the heating, and a drive much like ours. Their speed drive is a time distortion apparatus, I'll wager. It would be very natural for men on so huge a world to become acquainted early with the intricacies of dimensional space. Time distinction offers an easy solution of speed. All speed is relative—relative to other bodies, but also to time-speed. But we'll see.

"I'm going to hustle some workmen to installing the biggest spare power board I can get into the storerooms of the *Ancient Mariner*, and pack in a ray-screen. It will be useful. Let's move."

"Our ship," said Zezdon Afthen," will land in three of your hours."

CHAPTER IV

The First Move

THE Ortolians were standing in silent awe on a low, green-clad hill. Below them stretched the green flank of the little rise, and beyond lay ridge after ridge of the broad, smooth carpet of the beautiful Vermont hills. Little narrow valleys ran between mountains that extended back in serried ranks, while over their haze-blued masses a great ball of red fire sank behind the green curtain of the mountains. Little white clouds, stained with delicate rose, floated in a sky that was deep azure.

"Man of Earth," said Zezdon Afthen turning at last to Wade, who stood behind him. "It took us three months of constant flight at a speed unthinkable, through space dotted with the titanic gems of the Outer Dark, stars gleaming in red, and blue and orange, some titanic lighthouses of our course, others dim pinpoints of glowing color. It was a scene of unspeakable grandeur, but it was so awesomely mighty in its scope, one was afraid, and his soul shriveled within him as he looked at those inconceivable masses floating forever alone in the silence of the inconceivable nothingness of eternal cold and eternal darkness. One was awed, suppressed by their sheer magnitude. A magnificent spectacle truly, but one no man could love.

"Now we are at rest on a tiny pinpoint of dust in a tiny bit of a tiny corner of an isolated universe, and the magnitude and stillness is gone. Only the chirpings of those strange birds as they seek rest in darkness, the soft gurgling of the little stream below, and the rustle of countless leaves, break the silence with a satisfying existence, while the loneliness of that great star, your sun, is lost in its tintings of soft color, the fleeciness of the clouds, and the seeming companionship of green hills.

"The beauty of boundless space is awe-inspiring in its magnitude. The beauty of Earth is something man can love.

"Man of Earth, you have a home that you may well fight for with all the strength of your arms, all the forces of your brain, and all the energies of Space that you can call forth to aid you. It is a wondrous world." Silently he stood in the gathering dusk, as first Venus winked into being, then one by one the stars came into existence in the deepening color of the sky.

"Space is awesomely wonderful; this is—lovable." He gazed long at the heavens of this world so strange, so beautiful to him, looking at the unfamiliar heavens, as star after star flashed into the constellations so familiar to terrestrians and to those Venerians who had been above the clouds of Venus' eternal shroud.

"But somewhere off there in space are other races, and far beyond the power of our eyes to see is the star that is the sun of my world, and around it circles that little globe that is home to me. What is happening there now? Does it still exist? Are there people still living on it? Oh, Man of Earth, let us reach that world quickly, you cannot guess the pangs that attack me, for if it be destroyed think—forever I am without home—without friends I knew. However kind your people may be to me, I would be forever lonely.

"I will not think of that—only it is time your ship was ready, is it not?"

"I think we had better return," replied Wade softly, his English words rousing thoughts in his mind intelligible to the Ortolians.

The three rose in the air on the molecular suits and drove quickly down toward the blue gem of the lake to the east, nestled among still other green hills. Lights were showing in the great shop, where the *Ancient Mariner* was being fitted with the ray-shields, and all possible weapons. Men streaming through her were hastily stocking her with vast quantities of foods, stocks of fuel, all the spare parts they could cram into her stock rooms.

When the men arrived from the hilltop, the work was practically done, and Wade stepped up to Morey, busily checking off a list of required items.

"Everything you ordered came through?" he asked.

"Yes—thanks to Dad, and to the 'pull' of a two-billion dollar private fortune. Who says credit-units don't have their value? This expedition never would have gotten through, if it hadn't been for that. We succeeded in ditching two big orders in the process. Ganymede Mining lost some time—and they are already howling. So is Martian Lead—which is very sad.

"But we have the main space distortion power bank, and the new auxiliary coils full. Ten tons of lead aboard for fuel. Installed the ray screens, and have arranged so that the power tube banks that push them can be switched by relays from the control room almost instantly to ray power tubes. They all operate molecular rays as powerful as any known tube can handle. That's one thing we are afraid of. If the enemy have a system of tubes that is able to handle more power than our last tube—we're sunk. These brilliant people that suggest using more tubes to a ray-power bank forget the last tube has to handle the entire output of all the others, and modulate it correctly. If the enemy has a better tube—it will be too bad for us." Morey was frankly worried.

"My end is all set, Morey. How soon will you be ready?" Arcot asked.

"'Bout ten-fifteen minutes, I guess, Arcot." Morey lit an imported Venerian cigarette and watched as the last of the stuff was carried aboard, checking his list as load after load was carried in by molecular handler machines.

At last they were ready, some five minutes before Morey had assigned as the time for departure. The *Ancient Mariner*, originally built for intergalactic exploration, was kept in working condition, and used frequently, for whenever Arcot or Morey wanted to go to one of the other planets, they had used this large ship, for it could exceed the speed of light, and in it the trip to Venus, or even the plutium or element 103 mines of Pluto were but a few minutes from Vermont. New apparatus bad been incorporated in it, as their research had led to improvements, and it was constantly in condition, ready for a trip. Many exploration trips to the nearer stars had already been made.

ZEZDON AFTHEN was intensely interested in learning the mechanism of the ship, but Arcot had asked him to wait for the explanation till they had left Earth and were under way. There was so much to do in the meantime.

The ship was backed out from the hangar now, and rested on the great smooth landing field, its tremendous quarter million ton mass of lux and relux sinking a great, smooth depression in the turf of the field. They were waiting now for the arrival of the Ortolian, or better, Thessian ship. Zezdon Afthen assured them it would be there in a few minutes.

The field was brightly lit now, and the great beacon was stabbing its brilliant rays of red and blue far into the clear night sky, the rays almost invisible, for the air was unusually clear now.

High in the sky, came the whining whistle of an approaching ship, coming at terrific velocity. It came nearer the field, darting toward the ground at an unheard of speed, flashing down at a speed of well over three thousand miles an hour, and, only in the last fifty feet slowed with a sickening deceleration. Even so it landed with a crash of fully two hundred miles of speed. Arcot gasped at the terrible landing the pilot had made, fully expecting to see the great hull dent somewhat, even though made of solid relux. And certainly the jar would kill every man on board. Yet the hull did not seem harmed by the crash, and even the ground under the ship was but slightly disturbed, though, at a distance of some thirty feet, the entire block of soil was crushed, and cracked by the terrific impact of hundreds of thousands of tons striking with terrific energy.

"Lord, it's a wonder they didn't kill themselves. I never saw such a rotten landing," exclaimed Morey with disgust, himself one of the best pilots of Earth.

"Don't be too sure. I think they landed gently, and at very low speed. Notice how little the soil directly under them was dented?" replied Arcot, walking forward. "They have time control, as I suspected. Ask them. They drifted in gently. Their time rate was speeded up tremendously, so that what was hundreds of miles per hour to us was feet per minute to them. But come on, get the handlers to bring that junk up to the door—they are coming out." One of the tall, kindly-faced canine people was standing in the doorway now, the white light streaming out around him into the night, casting a grotesque shadow on the landing field, for all the flood lights bathing it.

Zezdon Afthen came up, and spoke quickly to the man evidently in command of the ship. The entire party went into the ship, and the "junk" Arcot had referred to, the cream of their laboratory instruments, was brought in by men operating handlers, little molecular motion ships, with powerful clamps and chains and magnets to lift almost any load short of a space ship. One of these machines could easily lift a load of a thousand tons, and float it where it was wanted. Yet they measured but five by two by three feet, and were controlled by men walking or flying beside them, holding the long flexible control cable.

For three long hours Arcot and Morey and Wade worked at the apparatus in the ship, measuring, calculating, observing, following electrical and magnetic and sheer force hook-ups of staggering complexity, hidden behind great switchboards that had to be cut open many times to reach the apparatus behind. They were not trying to find the exact method of construction, interested only in the principles involved, so that, with the data they collected here, they could perform calculations of their own, and duplicate or better the results of the enemy with apparatus designed by them. Thus they would be far more thoroughly familiar with the machinery when done.

Little attention was paid to the actual driving plant, for the Terrestrians quickly learned that it was purely molecular drive with the same type of lead-fuel burner they used in their own ship. The tubes of the power bank were, however, a puzzle to them. They were made of relux, so that it was impossible to see the interior of the tube. To open one was to destroy it, but calculations made from readings of their instruments, showed that they were more efficient, and could readily carry nearly half again the load that the best terrestrian tubes could sustain. This meant the enemy could send heavier rays and heavier ray screens.

But finally they returned to the *Ancient Mariner*, and as the Ortolian ship whined its way out to space, the *Ancient Mariner* started, rising faster and faster through the atmosphere till it was in the night of space. Then the molecular power was shut off, as the ship was pointed toward the far distant star of Ortol at Zezdon Afthen's instructions, or better, toward the landmark that would guide them. The ship suddenly seemed to writhe, space was black and starless about them, then sparkling weirdly distorted stars, all before them. They were moving, flashing by already. Almost before the Ortolians fully realized what was happening, a dozen stars had swung past the ship, driving on now at better than five light years in every second. At this speed, approximately fourteen hours would be needed to reach Ortol. The time could be spent in discussion, explanation, and calculation on the results they had obtained in investigating the Ortol ship.

"Now, Arcot, perhaps you will explain to me the secret of this ship," said Zezdon Afthen at last, turning from the great lux pilot's window, to Arcot seated in the pilot's chair. "But I know beforehand that only the broadest principles will be intelligible to me, for I could not understand that ship we captured, after almost four months of study. Yet it crept through space at the veriest snail's pace compared with this ship. Certainly no ship could outdistance this in a race!" he smiled.

"As a matter of fact—watch!" Arcot pushed a little metal button along a slide to the extreme end. Again the ship seemed to writhe. Space was no longer black, but faintly gray, and beside them, on either side, floated two exact replicas of their ship! In amazement Zezdon Afthen stared. But in another moment, both were gone, and space was black, yet in but a few moments a grayness was showing, and light was appearing from all about, growing gradually in intensity. For perhaps three seconds Arcot continued thus, then he pulled the metal button down the slide, and flicked over another that he had pulled to cause the second change. The stars were again before them, their colors changed beyond all recognition at that speed. But the orientation of the stars behind them had been familiar. Now an entirely different set of constellations showed.

"I merely opened the ship out to her maximum speed for a moment. I was able to see any large star 2000 light years in our path, and there were none. Small stars do not bother us as I will explain. When I put on full power of the main power coils, I drove the ship up to a speed of 30 light years a second. When I turned in the full power of the auxiliary coils as well I doubled the power, and the speed was multiplied by eight. The result was that in the four seconds of racing, we made approximately 1000 light years!"

Zezdon Afthen gasped. "Two hundred and forty light years *per second!*" he paused in bewilderment. "Suppose we had struck a small sun, a dark star, even a meteor at that speed? We would have been—The Great Will alone knows what would have been the result!"

"No, I know the result," smiled Arcot, "otherwise I wouldn't have done it. The chances are excellent that we plowed through more than one meteor, more than one dark star, and more than one small sun.

"But this is the secret: the ship attains the speed only by going out of space. *Nothing in space can attain the speed of light, save radiation!* Nothing in normal space. But, we alter space, make space along patterns we choose, and so distort it that the natural speed of radiation is enormously greater. In fact, we so change space that nothing can go *slower* than a speed we fix.

"Morey—show Afthen the coils, and explain it all to him. I've got to stay here."

At Arcot's suggestion, Morey rose, and diving through the weightless ship, went down to the power room, and back to the coil room, Zezdon Afthen following. Here, giant pots five feet high were stocked in close packed rows. The "pots" contained specially designed coils storing tremendous energy, the energy of four tons of disintegrated lead, in the only form that energy may be stored, as a strain, or distortion in space. These charged coils distorted only the space within themselves, making a closed field entirely within themselves. But in the exact gravitational center of the quarter of a million ton ship was a single high coil of different design that distorted space around it, as well as the space within it. This, as Morey explained, was the control that altered the constants of space to suit. The coils were charged, and the energy stored. Their energy could be pumped (by the use of other energy) into the big coil, and then, when the ship slowed to normal space, could be pumped back to them. The pumping energy, as well as any further energy needed for recharging the coils could be supplied by three huge power generators.

"These energy-producers," explained Morey, hesitating to call an apparatus designed to convert the energy of lead, or matter, into electrical energy an "energy-producer," "work on a principle known for hundreds of years on Earth, but not applied till Arcot thought up this thing. Lead, when reduced to a temperature approaching absolute zero as closely as, for instance, liquid helium, has *no* electrical resistance. In other words, no matter how great a current is sent through it, there is no resistance, and since r is zero in formula for the heat produced in a resisting wire, I^2r, no heat is produced to raise the temperature. What we do is to send a powerful current through a lead wire. The wire has a current density so huge that the atoms are destroyed, and the protons and electrons coalesce into pure radiant energy. Since the mass of a proton and an electron is very nearly the mass of a cosmic ray proton, cosmic rays are given off. Relux, under the influence of a magnetic field, converts cosmic rays directly into electrical potential in a way as yet scarcely explained, apparently—well, lux metal is transparent, and like all transparent substances does not conduct electricity by metallic conduction. But relux is not transparent; it is reflective, and for some unknown reason, transmits electricity. However, not being an electric substance, but made of light photons bound by their own weight, or mass-attraction, it can scarcely transmit electrons. Apparently it transmits the spatial strain that is an electric current. Remember that electricity travels at 186,000 miles per second, yet electrons cannot travel anywhere near that speed, and, as a matter of fact, travel slowly. In fact, under ordinary conditions, the drift speed of electrons carrying current in an electric wire is of the order of—about the length of my arm per second. Of course, in the lead wire in the generators, due to the enormous current density, the drift speed is enormous, which causes the destruction of matter.

"Yet with so low a speed of electrons, electricity moves at the speed of radiation along the wire! The answer is that some spatial force moves along the wire. Relux will conduct that spatial strain also, and without resistance. Furthermore, the combination of cosmics and magnetic field produces that force in relux. Thus we can convert lead directly to cosmics, and cosmics directly to electricity. Electricity we can convert to the spatial strain in the power coils, and thus the ship is driven." Morey pointed out the huge molecular power cylinder overhead, where the main power drive was located in the inertial center of the ship, or as near as the great space coil would permit. Explaining to him how the directed molecules confined in the tank, helium in this case, supplied the power when heated, he pointed out the matter-destroying apparatus at the end of the cylinder where cosmics were thrown on the relux plate which alone could stand their destructive power, and converted by it into pure heat, which the helium molecules absorbed, and used to drive the ship.

The smaller power units for vertical lift, and for steering, were in the side walls, hidden under heavy walls of relux.

"The projectors for throwing molecular and cosmic rays are on the outside of course. Both of these projectors are protected, both against cosmic rays and molecular rays. The walls of the ship are made of an outer wall of heavy lux metal, a vacuum between, and an inner wall of heavy relux. The lux is stronger than relux, and is therefore used for an outer shell. The inner shell of relux will reflect any dangerous cosmics, and serve to hold the heat in the ship, since a perfect reflector is a perfect non-radiator. The vacuum wall is to protect the occupants of the ship against any undue heat. If we should get within the atmosphere of a sun, it would be disastrous if the physical conduction of heat were permitted, for though the relux will turn out any radiated heat, it is a conductor of heat, and we would roast almost instantly. These artificial metals are both absolutely infusible and non-volatile. The ship has actually been in the limb of a star, and a star tremendously hotter than your sun or mine. We have made several trips to the sun, actually descending into the great sunspots for investigation. Once one started to close in over us, and we had to escape into artificial space.

"Now you see why it is we need not fear a collision with a small sun, meteor or such like. Since we are in our own, artificial space, we are alone, and there is nothing in space to run into. But, if we enter a huge sun, the terrific gravitational field of the mass of matter would be enough to pull the energy of our coil away from us. That actually happened the time we made our first inter-galactic exploration. But it is almost impossible to fall into a large star—they are too brilliant in general, and only in very, very, very rare cases are invisible. It was one of those impossibly rare cases we struck. We never did succeed in convincing astronomers we did. It will be some 50,000,000 years before the visual proof reaches Earth. By that time we won't be worrying about it," grinned Morey.

"And every second we speak here, we move five light years further? Nearly 30,000,000,000,000 miles each single second?" Zezdon Afthen was looking out through the small lux window to the strange space about them.

"That's about right I think," replied Morey.

"But how did the ship we captured operate?" asked Zezdon Fentes, who had come in shortly after Morey had begun his explanations.

"It was a very ingenious system, very closely related to ours, really.

"We distort space and change the velocity characteristics; in other words, we distort the rate of motion through distance characteristics of normal space. The Thessian ships work on the principle of distorting the rate of progress through time instead of through space.

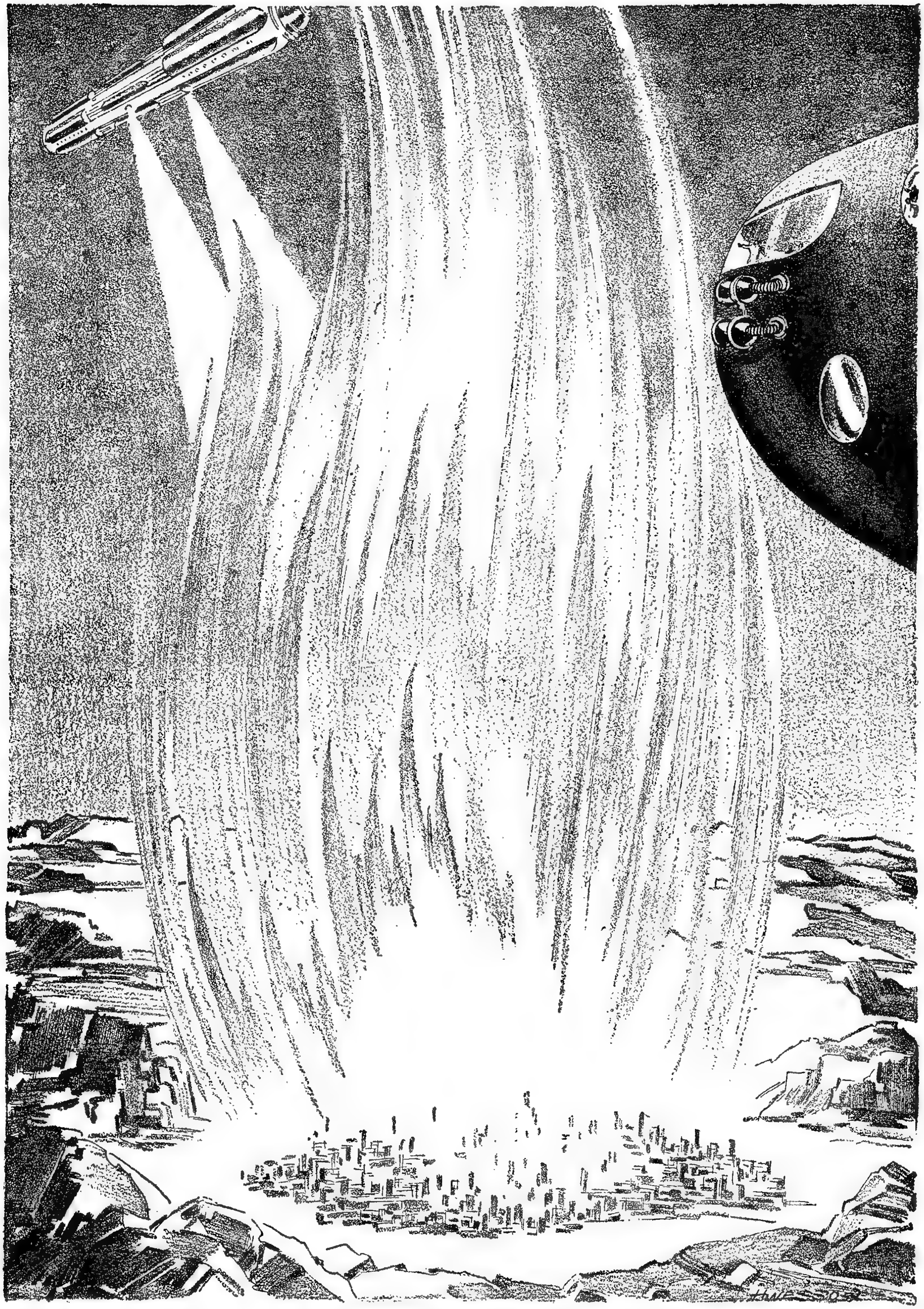
"*Velocity* is really 'units of travel through space per unit of travel through time.' Now if we make the time unit twice as great, and the units traveled through space are not changed, the *velocity* is twice as great. That is, if we are moving five light-years per second, make the second twice as long and we are moving ten light years per double-second. Make it ten thousand times as long, and we are traveling fifty thousand light years per ten-thousand-seconds. This is the principle—but there is a drawback. We might increase the velocity by slowing time passage, that is, if it takes me a year for one heart-beat, two years to raise my arm thus, and six months to turn my head, if all my body processes are slowed down in this way, I will be able to live a tremendous length of time, and though it takes me two hundred years to go from one star to another, so low is my time rate that the two hundred years will seem but a few minutes. I can then make a trip to a distant star—one five light years distant let us say, in three minutes to me. I then will say, looking at my chronometer (which has been similarly slowed) 'I have gone five light years in three minutes, or five thirds light years per minute. I have exceeded the speed of light.'

"But people back on Earth would say, he has taken two hundred years to go five light years, therefore he has gone at a speed one fortieth of that of light, which would be true—for their time rate.

"But suppose I can also speed up time. That is, I can live a year in a minute or two. Then everyone else will be exceedingly slow. The ideal thing would be to combine these two effects, arranging that space about your ship will have a very rapid time rate, ten thousand times that of normal space. Then the speed of radiation through that space will be 1,860,000,000 miles per second, and a speed of 1,000,000,000 miles per second would be possible, but still you, too, will be affected, so that though the people back home will say you are going far faster than light, you will say 'No, I am going only 100,000 miles per second.'

"BUT now imagine that your ship and surrounding space for one mile is at a time rate 10,000 times normal, and you, in a space of one hundred feet within your ship, are affected by a time rate 1/10,000 that, or normal, due to a second, reversing field. The two fields will not fight, or be mutually antagonistic; they will merely compound their effects. Result: you will agree that you are exceeding the speed of light!

"Do you understand? That is the principle on which



A ray of intense, blindingly brilliant light flashed out, and a gout of light appeared in the center of the city. A huge flame, bright blue, shot heavenward in roaring heat.

your ship operated. There were two time-fields, overlapping time-fields. Remember the terrible speed with which your ship landed, and yet there was no appreciable jar according to the men? The answer of course was, that their time rate had been speeded enough, due to the fact that one field had been completely shut off, the other had not.

"That is the principle. The system is so complex, naturally, that we have not yet learned the actual method of working the process. We must do a great deal of mathematical and physical research.

"Wish we had it done—we could use it now," mused the Terrestrian.

"We have some other weapons, none as important, of course, as the molecular ray and the cosmic ray. Or none that have been. But, if the enemy have ray shields, as I am sure they must have, then perhaps these others also will be important. There are molecular motion guns, metal tubes, with molecular director apparatus at one end. A metal shell is pulling the power turned on, and the shell leaps out at a speed of about ten miles per second—since it has been superheated—and is very accurately aimed, as there is no terrific shock of recoil to be taken up by the gun.

"But a more effective weapon, if these men are as I expect them to be, will be a peculiarly effective magnetic field concentrator device, which will project a magnetic field as a beam for a mile or more. How useful it will be—I don't know. See, that tremendously heavy mounting up there is one of the three beam projectors aboard. They are connected with the power coils which permits us to build an enormous field in an exceedingly short time. An attractive force of as high as fifty thousand *g** can be created on a piece of soft iron.

"But—we don't know what the enemy will turn against us?"

CHAPTER V

Ortol

SHORTLY after Morey's explanation of the ship was completed, Wade took Arcot's place at the controls, while Morey and Arcot slept. The day of Ortol was close to fifty hours, so that many hours more would pass before the Ortolians would be tired.

When Arcot rose after four hours intensified sleep under the new drug, morcon, and Morey a few moments later, they retired to the calculating room to do some of the needed mathematics on the time-field investigation.

Their work continued here, while the Ortolians prepared a meal and brought it to them, and to Wade. When at last Ortol, and the sun of Ortol was growing before them, Arcot took over controls from Wade once more. Slowing their speed to less than fifty times that of light, they drove on. The attraction of the giant sun was draining the energy from the coils so rapidly now, that at last Arcot was forced to get into normal space, while the planet was still close to a million miles from them. Morey was showing the Ortolians the operation of the telectroscope and had it trained now on the rapidly approaching planet. It was difficult to keep it trained on the planet in question as the ship moved and turned slightly under the complex attraction of planets and sun. But the planet was easily enlarged to a point where the features of continents were visible. Minutes sped as they neared, and finally, wholly within the gravitational field of Ortol, the ship steadied. The magnification was increased till cities were no longer blurs, but truly cities.

Suddenly, as city after city was brought under the action of the machine, the Ortolians recognizing them with glad exclamations, one swept into view—and as they watched, it leapt into the air, a vast column of dust, then, twisting, whirling, it fell back in utter, chaotic ruin.

"Thestis—my wives—my children—" Zezdon Fentes staggered back from the screen in horror.

"Arcot—drive down—increase your speed—the Thessians are there already and have destroyed one city," called Morey sharply. "Hang on Afthen." Then men grasped handholds, while they secured themselves with heavy belts, as the deep toned hum of the warning echoed through the ship. A moment later they staggered under an acceleration of four gravities. Space was dark for the barest instant of time, and then there was the terrible, screaming hum of atmosphere split as the ship rocketed through the air of the planet at nearly fifteen hundred miles per second. The outer wall was blazing in incandescence in a moment, and the heavy relux screens seemed to leap into place over the windows as the blasting heat, radiated from the incandescent walls, flooded in. The telectroscope was sadly handicapped now, for the walls protecting the view-elements were white hot. Arcot was controlling the ship by his view plates. The space distortion had thrown them to the planet, nearly a million miles, in so brief a time that the ship had but started to slow under the reserve acceleration, and now the millions of tons pressure of the air on the nose of the ship would have brought it to a stop in an instant, had it not been that the molecular drive was on at full power, driving the ship against the air resistance, and still losing. The ship slowed swiftly, but was shrieking toward the destroyed city at terrific speed.

Zezdon Fentes sat in his chair, his chaotic thoughts thrown into the surrounding space hindering the others. Zezdon Afthen reached over and removed the headset from him.

"Hesthis—to the—right and ahead. That would be their next attack," said the Ortolian. Arcot, catching the thought, altered the ship's course, and they shot toward the distant city of Hesthis. They were slowing perceptibly, and yet, though the city was half around the world, they reached it in half a minute. Now Arcot's wizardry at the controls came into play, for by altering his space field constants, he succeeded in reaching a condition that slowed the ship almost instantly to a speed of but a mile a second, yet without apparent deceleration.

High in the white Ortolian sky was a shining point bearing down on the now-visible city. Arcot slanted toward it, and the approaching ship grew like an expanding rubber balloon.

A ray of intense, blindingly brilliant light flashed out, and a gout of light appeared in the center of the city. A huge flame, bright blue, shot heavenward in roaring heat.

"Cosmic—turn the atoms of the soil into hydrogen, and it's burning," snapped Morey in response to Afthen's question.

Arcot was in action. In an infinitesimal time he had slowed the ship to a speed of a few hundred miles per hour when it was possible to turn in a reasonable circle. The Thessian ship had spotted them, though Arcot had tried the invisibility apparatus, without much hope, confessedly. Seeing that a strange ship had arrived was enough for the Thessians, and they turned, and drove at Arcot instantly. The Thessian ship was built for a heavy world, and for heavy accelerations in consequence, and, as they had found from the captured ship, it was infinitely stronger than the *Ancient Mariner.* Now the Thessians were driving at Arcot with an acceleration and speed that convinced him dodging was useless. Suddenly space was black around them, the sunlit world was gone.

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*The letter *g* indicates the acceleration of gravitation of the earth. It is expressed in feet per second or other dimensions, such as centimeters per second.

"Wonder what they thought of *that!*" grinned Arcot. Wade smiled grimly.

"It's not what they thought, but what they'll do, that counts. That, and what we'll do."

Arcot came back to normal space, just in time to see the Thessian ship spin in a quick turn, under an acceleration that would have crushed a human to a pulp. Again the pilot dived at the Terrestrian ship. Again it vanished. Twice more he tried these fruitless tactics, seeing the ship loom before him—bracing for the crash—then it was gone instantaneously, and though he sailed through the spot he knew it to have occupied, it was not there. Yet an instant later, as he turned, it was floating, unharmed, exactly where his ship had passed!

Rushing was useless. He stood, and prepared to give battle. A molecular ray reached out—and disappeared in flaring ions on a shield utterly impenetrable in the ionizing atmosphere.

Arcot meanwhile watched the instrument of his shield. The Thessian shield would have been impenetrable, but his shield, fed by less efficient tubes, was not, and he knew it. Already the terrific energy of the Thessian ray was noticeably heating the copper plates of the tube. The seal would break soon.

Another ray reached out, a ray of flaring light. Arcot, watching through the "eyes" of his telectroscope viewplates, saw it for but an instant, then the "eyes" were blasted, and the screen went blank.

"Trying cosmics. He won't do anything with that, but burn out eyes," muttered the Terrestrian. He pushed a small button when his instruments told him the cosmics were off. Another scanner came into action, and the viewplate was alive again.

Arcot shot out a cosmic ray himself, and swept the Thessian with it thoroughly. For the instant he needed the enemy ship was blinded. Immediately the *Ancient Mariner* dove, and the automatic ray-finders could no longer hold the rays on his ship. As soon as he was out of the deadly molecular ray he shut off his screen, and turned on all his molecular rays. The Thessian ship, their own ray on, had been unable to put up their screen, as Arcot was unable to use his ray with the enemy's ray forcing him to cover with a shield.

ALMOST at once the relux covering of the Thessian ship shone with characteristic iridescence as it changed swiftly to lux metal. The molecular ray blinked out, and a ray screen flashed out instead. The Thessians were covering up. Their own rays were useless now. Though Arcot could not hope to destroy their ray shield, they could no longer attack his, for their rays were useless, and already they had lost so much of the protective relux, that they would not be so foolhardy as to risk a second attack of the ray. Arcot kept one ray on them at low power. Their screen was flaming in ions, for "low" power meant power of the order of 10,000 kilo-watts.

Arcot continued to bathe the ship in cosmics, keeping their "eyes" closed. As long as he could hold his barrage on them, they would not damage him.

"You've got him tied—what are you going to do with him?" asked Morey, suddenly coming in. "Sort'a got the bear by the tail."

Arcot didn't answer. He was busy with switches.

Finally he answered: "Morey—get into the power room, strap onto the board. Throw all the power-coil banks into the magnets. I may burn them out, but I have hopes—." Arcot already had the generators going full power, charging the power coils.

Morey dived. Almost simultaneously the Thessians succeeded in the manoeuver they had been attempting for some time. There were a dozen cosmic rays flaring wildly from the ship, searching blindly over the sky and ground, hoping to blindly stumble on the enemy ship, while their own ship dived and twisted blindly. Arcot was busily dodging the sweeping rays, but finally one hit his viewplates, and his own ship was blind. Instantly he threw the ray screen out, cutting off his own molecular ray. His own cosmics he set rotating in cones that covered the three dimensions—save below, where the city lay. Immediately the Thessian had retreated to this one segment where Arcot did not dare throw his own rays. The Thessian cosmics continued to make his relux screens necessary, and his ship remained blind.

His ray screen was showing signs of weakening. The Thessians got a third ray into position for operation, and opened up. Almost at once the tubes heated terrifically. In an instant they would give way. Arcot threw his ship into space, and let the tubes cool under the water jacket. Morey reported the coils ready as soon as he came out of space.

The cosmics, in all probability, would not be bathing the ship when he came back to normal space, for it is utterly impossible for anyone or any machine to locate an invisible machine from a swiftly moving ship when it is flying in air, with no possible landmarks near. Further, their ship moved somewhat, due to its centrifugal force about the planet, since it was now cut off from the planetary gravity.

Arcot cut in the new set of eyes, put up his molecular ray screen again, with the cooling solution once more at -37° C. Flowing over the tubes. Then he cut the energy back to the coils.

Half a mile below the enemy ship was vainly scurrying around an empty sky. Wade laughed at the strange resemblance to a puppy chasing its tail. The *Ancient Mariner* was utterly lost to them.

"Well, here goes the last trick," said Arcot grimly. 'If this doesn't work, they'll probably win, for their tubes are better than ours, and their cosmics are just as good, and they can maneuver faster. By win I mean force us to let them attack Ortol. They can't really attack us, artificial space is a perfect defense."

Arcot's molecular ray apprized the Thessians of his presence once more. Their screen flared up once more. Arcot was driving straight toward their ship as they turned. He snapped the relux screens in front of his eyes an instant before the enemy cosmics reached his ship. Immediately the heavy thud of four heavy relays rang through the ship. The quarter of a million ton ship leaped forward under a terrific acceleration, and then, as the four relays cut out again, the acceleration was gone. The screen regained life as Arcot opened the shutters. Before them, still directly in their path, was the huge Thessian ship. But now its screen was down, the relux iridescent in decomposition. It was falling, helplessly falling to the rocky plateau seven miles below. Its cosmic rays reached out even yet—and again the *Ancient Mariner* staggered under the terrific pull of some acceleration. The Thessian ship lurched upward, and the cosmic ray seemed to explode, a terrific concussion came, and the entire neighborhood of that projector disappeared in a flash of radiation.

Arcot drove the *Ancient Mariner* down beneath the Thessian ship in its long fall, and with a powerful molecular beam ripped a mighty chasm in the deserted plateau. The Thessian ship fell into a quarter mile rift in the solid rock, smashing its way through falling débris. A moment later it was buried beneath a quarter mile of broken rock as Arcot swept a molecular beam about with the grace of a mine foreman filling breaks.

An instant later and a cosmic ray followed the molecular in dazzling brilliance. A terrific gout of light appeared in the barren rocks. It flared white, and great blue flames of burning hydrogen reached up, thick, black vapor rolled up to condense in dust of rock in the air. In ten minutes the plateau was a white hot cauldron of molten rocks, glowing now against a darkening sky. Night was falling.

"That ship," said Arcot with an air of finality, "will never rise again."

CHAPTER VI

The Second Move

WELL the Terrestrians knew, that that ship would never rise again, but after it another would come, and then more—and more.

"What happened to him though, Arcot. I haven't yet figured it out. He went down in a heap, and he didn't have any power. Of course, if he had his power he could have pulled out again. He could just melt that rock again, and rise out of it. Go take a bath in the sun, and burn all the excess rock off, and he would be all set. The sun wouldn't bother that lux metal any, nor would the molten rock. But his rays all went dead. How come? Even his power—and why the explosion?" asked Wade, bewildered.

"The magnetic beam is the answer. Think—in our boat we have everything magnetically shielded, because of the enormous magnetic flux set up by the current flowing from the storage coils to the main coil, so the magnetic rays of our iron-boned friends of Nansaland Sator didn't in the least hinder us. But—with so many wires heavily charged with current, what would have happened if they had not been shielded?

"If a current cuts across a magnetic field a side thrust is developed. What do you suppose happened when the terrific magnetic field of the beam and the currents in the wires of their power-board were mutually opposed?" asked Arcot.

"Lord, it must have ripped away everything in the ship. It'd tear loose even the lighting wires!" gasped Wade in amazement.

"But if all the power of the ship was destroyed in this way, how was it that one of their rays was operating as they fell?" asked Zezdon Afthen.

"Each cosmic ray is a power plant in itself," explained Arcot, "and so it was able to function. I do not know the cause of the explosion, though it might well have been that they had light-bombs such as the Kaxorians of Venus have," he added, thoughtfully.

They landed, at Zezdon's advice, in the city that their arrival had been able to save. This was Ortol's largest city, and their industrial capital. Here, too, was the University at which Afthen taught. Hesthis was the Chicago of Ortol, their largest city, and most important industrial city. Chicago's position had been won by its central location with air, land and water facilities at hand. It was in the center of the richest continent of Earth.

Hesthis was located on a huge river which gave the city access to land, river and ocean. Flying was still a rudimentary art on Ortol. Their machines were but half a century old in their development, and capable of little more than six hundred miles per hour at best, and their cruising speed was held down to approximately three hundred miles. Therefore, the air was not as yet important.

They landed here, and Arcot, Morey and Wade, with the aid of Zezdon Afthen and Zezdon Fentes worked steadily for two of their days of fifty hours each, teaching men how to make and use the molecular ships, and the rays and screens, the cosmics, and relux. But Arcot promised that when he returned he would have some weapon that would bring them certain and easy salvation. He said "when," but his thought came near to being "if." In the meantime other terrestrians would follow him.

They left the morning of their third day on the planet. A huge crowd had come to cheer them on their way as they left, but it was the "silent cheer" of Ortol, a telepathic well-wishing.

"Now," said Arcot as their ship left the planet behind, "we will have to make the next move. It certainly looks as though that next move would be to the still-unknown race that lives on world 3769-37,478,326,894-6. Evidently we will have to have some weapon they haven't, and I think that I know what it will be. Thanks to our trip out to the Islands of Space."

"Shall we go?"

"I think it would be wise," agreed Morey.

"And I," said Wade. The Ortolians agreed, and so, with the aid of the photographic copies of the Thessian charts that Arcot had made, they started for world 3769-37,478,326,894-6.

"It will take approximately twenty-two hours, and as we have been putting off our sleep with drugs, I think that we had better catch up. Wade, I wish you'd take the ship again, while Morey and I do a little concentrated sleeping. We have by no means finished that calculation, and I'd very much like to. We'll relieve you in five hours."

Wade took the ship, and following the course Arcot laid out, they sped through the void at the greatest safe speed. Wade had only to watch the view-screen carefully, and if a star showed as growing rapidly, it was proof that they were near, and nearing rapidly. If large, a touch of a switch, and they dodged to one side, if small, they were suddenly plunged into an instant of unbelievable radiation as they swept through it, in a different space, yet linked to it by radiation, not light, that were permitted in.

"How is it," he asked of Zezdon Afthen who had elected to stay with him, "that Zezdon Fentes so quickly forgot his loss?" The promptness with which Zezdon Fentes had put behind him the loss of his family had been rather a disappointment to the terrestrian. The canines are an affectionate and faithful race, and that one could be so apparently forgetful rather piqued Wade, as it did the other terrestrians.

"That, my friend, is a thing that has evidently rather bothered you of Earth. Affection we have, you know it as a characteristic of our race—affection and loyalty.

"But you know of lower members of our race, dogs, who have lain starving on their masters' graves. Affection—uselessly and senselessly applied. Is it not equally useless and senseless to mourn for the dead wife or the dead children when we reach a higher stage? To forget them—that would be insulting to their memory. But to mourn them with useless, senseless loss of health and balance is also insulting, not only to their memory, but to the race.

"No, we have a better way. Fentes, my very good friend, has not forgotten, nor have you forgotten the death of your mother, whom you loved. But you no longer mourn her death with a fear and horror of that natural thing, the Eternal Sleep. Time has softened the pain.

"If we can do the same in five minutes instead of five years, is it not better? That is why Fentes has *forgotten*."

"Then you have aged his memory of that event?" asked Wade in surprise.

"That is one way of stating it," replied Zezdon Aften seriously.

"But you spoke of his wives. Your customs are polygamous?"

"It was a custom given us by the Ancient Masters. Always we attempt to improve our race. On our world we have neither prison nor police force. We have no criminals. We waste no foolish sympathy and we divert no productive energy to caring for the defects nature puts among us—the mistakes Nature inflicts on us.

"If we have a criminal, a murderer, one who becomes insane, it shows an inherent weakness. Certainly we want none such in our world. He is removed, painlessly, and the minds of all who knew him, or loved him, are *aged,* as you put it. His children, if he has any, may not propagate. His parents, if they are still young may not propagate further. It probably seems cruel to you, to whom the right to reproduce is inviolate—but you were evolved in a hap-hazard accidental manner by Nature. We were a scientifically evolved race, such an imposed breeding of our own stock seems but natural and right to us.

"Similarly, at the high end, the best of our men are permitted two or more wives, the wives being selected as most suited to them, in every way physically and mentally their equals. It improves our race. With astounding rapidity we are advancing. We have bred solely for psychic powers I fear, and the result has been a rather poor showing for our race in mechanical and physical scientific lines. But we are correcting our mistake.

"So Zezdon Fentes, as the first Student of Thought, had five wives. He had seventeen children I believe. It was a great loss to him, and to our world, for all of the women were very brilliant students of Physics. It is not the last of these losses, nor the only one, I fear."

"I am afraid I will have to agree with you," said Wade sorrowfully.

"BUT tell me," he asked curiously, "if such a system of artificial marriages is satisfactory. Are not the parties to such an agreement frequently mutually distasteful?"

"Oh, that problem was easily solved. For instance, my first wife was but seventeen—twenty-one of your years old—when I married her, and she was very much in love with a young man of Art. He was a genuine genius, and has since been given three wives, yet my wife, with her ability in the natural sciences, was certainly far more valuable to our race if mated with some one of similar taste and temperament. Therefore her love for the artist was blanked, and aged, then a feeling of the obvious unfitness of the thing was impressed upon her mind. Then, both her mind and mine were made to conform for domestic happiness, without our knowing for whom we were being fitted. Doubtless the 'chance' meeting that brought us together first was arranged." He smiled whimsically.

"A most wonderful woman she is, and she has always been my ideal. At that," he smiled, "it may be that it was at that impressioning that her picture was given to my hand. I do not know. And why worry, we seek only happiness in this world, and if happiness is found with her, as it is, why worry if it is at the will of another? If another has made me love her—what matter? I love her as truly as any man of your world may love the woman of his choice. The love may have been induced—but it is love we seek, not its reason.

"But with the other wives, it is always a great problem. Out of fairness, the love for the first wife is always made the deepest, yet for each there is a great and sincere love. It is a thing natural to our inheritance and I know my wives never have the jealous quarrels I see your mind pictures," he finished with a smile.

"It isn't safe thinking things around you," laughed Wade. "Just the same, all of this has made me even more interested in the 'Ancient Masters' to whom you so frequently refer. Who were they?"

"The Ancient Ones," began Zezdon Afthen slowly, "were men such as you are. They, too, descended from a primeval arboreal omnivorous mammalian, an animal very closely related to your race. Evidently the tendency of evolution on any planet is approximately the same with given conditions.

"The race existed as a distinct branch of what you call the primate family for approximately 1,500,000 of your years before any noticeable culture was developed. Then it existed for a total of 1,525,000 years before extinction. With culture and learning they developed such marvelous means of killing themselves that in twenty-five thousand years they succeeded perfectly," he said ironically. Ten thousand years of barbaric culture—I need not relate it to you, five thousand years of the medieval culture, then five thousand years of true culture, true civilization. They developed science, they learned to harness nature.

"They learned to fly through space very shortly after, and nearly populated three worlds; two were fully populated, one was still under colonization when the great war broke out. It started over a silly thing. So wise as the Ancient Ones were—it seems impossible. It actually started because one man's hand slipped—one minor official of a large transportation company. One transport going from Ortol to Selto was nearing another coming from the colony on Thenton. The colony was a settlement of Selto. The Ortolian ship was drawing past the slightly slower moving Thentian ship. Then—a meteor appeared. The Ortolian pilot saw it, turned to avoid it. The Thentian pilot was but recently inaugurated as a licensed pilot. He was nervous in juxta-position to the swiftly moving mass of the other ship, and at the sudden movement he pushed the wrong control—and some few escaped in the life tanks. Guard ships picked them up.

"An interplanetary situation developed. Selto blamed Ortol for the destruction of their ship and the loss of many lives. Ortol, willing to admit that no one was to blame at first, now decried the Thentian pilot.

"So it started. An interplanetary war is not a long drawn out struggle. The science of any people so far advanced as to have interplanetary lines is too far developed to permit any long duration of war. Selto declared war, and made the first move. They attacked, and destroyed the largest city of Ortol of that time. Ortolian ships drove them off, and in turn attacked Selto's largest city. Twenty million intelligencies, twenty million lives, each with its aims, its hopes, its loves and its strivings—gone in four days.

"The war continued to get more and more hateful, till it became evident that neither side would be pacified till the other was totally subjugated. So each laid his plans, and laid them to wipe out the entire world of the other.

"Selto sent a ship, a tiny scout plane, and it headed toward one of the great camps where the last of Ortolians were staying. Ortolian ships attacked it, and the pilot, diving to escape their attack, crashed blindly into a mountainside. A soft explosion blew the ship to pieces and scattered it broadside. I say soft, because it was not a sharp, true explosion, but more the sudden release of pressure, such as an exploding tank would give. But Ortol had succeeded in destroying the ship, whatever its foolhardy mission, and in the meantime their own scientists were busy. They had constructed a ray machine, a huge projector, powerful enough to send its beam to the distant planet, Selto, then less than 72,000,000 of your miles away. It was a ray of light that made things not happen," explained Zezdon Afthen, his confused thoughts clearly indicating his own uncertainty.

"'A ray of light that made things not happen,'" repeated Wade curiously. "A ray, which prevented things, which caused processes to stop—*The Negrian Death Ray!*" he exclaimed as he suddenly recognized, in this crude and garbled description of its powers, the Negrian ray of anti-catalysis, a ray which tended to stop the processes of life's chemistry and bring instant, painless death.

"Ah, you know it, too?" asked the Ortolian eagerly. "Then you will understand what happened. The ray was turned first on Selto, and as the whirling planet spun under it, every square foot of it was wiped clean of every living thing, from gigantic Welsthan to microscopic Ascoptel, and every man, woman and child was killed, painlessly, but instantly.

"Then Thenten spun under it, and all were killed, but many who had fled the planets were still safe—many?—a few thousand.

"THE day that Thenten spun under that ray, men of Ortol began to complain of disease—men by the thousands, hundreds of thousands. Every man, every woman, every child was afflicted in some way. The diseases did not seem all the same. Some seemingly died of a disease of the lungs, some went insane, some were paralyzed, and lay helplessly inactive. But most of them were afflicted by a terrible, loathsome disease, and they died like flies, for it was exceedingly virulent, and the normal serums were helpless. So swift was its work, no new serums could be made in time.

"Communication was established with the few Seltonians, and now all realized the terrible thing they had done. The Seltonians expressed their willingness to aid in any way they could, and told the Ortolians how to make the serums. But before any quantity was made, nearly all the population, all but a slender remnant had died, either of starvation through paralysis, none being left to care for them, or from the disease itself, while thousands who had gone mad were painlessly killed.

"The Seltonians came to Ortol, and the remaining Ortolians, with their aid, tried to rebuild the civilization. But what a sorry thing! The cities were gigantic, stinking, plague-ridden morgues. And the plague broke among those few remaining people. The Ortolians had done everything in their power with the serums—but too late. The Seltonians had been protected with it on landing—but even that was not enough. Again the wild fires of that loathsome disease broke out.

"Since first those men had developed from their hairy forbears, they had found their eternal friends were the dogs, and to them they turned in their last extremity, breeding them for intelligence, hairlessness, and resemblance to themselves. The Deathless ones alone remained after three generations of my people, but with the aid of certain rays, the rays capable of penetrating lead for a short distance, and most other substances for considerable distances." X-rays, thought Wade. "Great changes had been wrought. Already they had developed startling intelligence, and were able to understand the scheme of their Masters. Their feet and hands were being modified rapidly, and their vocal apparatus was changing. Their jaws shortened, their chins developed, the nose retreated.

"Generation after generation the process went on, while the Deathless Ancient Ones worked with their helpers, for soon my race was a real helping organization.

"But it was done. The successful arousing of true love-emotion followed, and the unhappy days were gone. Quickly development followed. In five thousand years the new race had outstripped the Ancient Masters, and they passed, voluntarily, willingly joining in oblivion the millions who had died before.

"Can you appreciate their loneliness, Earth Man? Can you picture the thousands of long, bleak years with their race dead, knowing that for all eternity they could never live again? That only through our race could they leave their mark? Five thousand long years of work, solitary hopeless work, longing always to join those who had long since gone, the friends, the relations, wives, mothers, sweethearts, whose memory alone was with them for those long, long, blank years? When their hearts eternally cried, 'No hope. There is no hope. Hope is dead. Let us die too. Let us join those who have perished in eternal, restful oblivion. Why this mad, long straining, when there can be only death. Why live? Join the multitude of your own in Death's gentle arms.' But at last they died, and were at peace.

"Since then our own race has risen, it has been but a short thousand years, a thousand years of work, and hope, and continuous improvement for us, continual accomplishment on which we can look, and a living hope to which we could look with raised heads, and smiling faces.

"Then our hope died, as this menace came. Do you see what you and your world was meant to us, Man of Earth?" Zezdon Afthen raised his dark eyes to the terrestrian with a look in their depths that made Wade involuntarily resolve that Thet and all Thessians should be promptly consigned to that limbo of forgotten things where they belonged.

CHAPTER VII

World 3769-37,478,326,894-6, Talso

WADE sat staring moodily at the screen for some time, while Zezdon Afthen, sunk in his own reveries, continued in thought. Suddenly Wade looked again toward Afthen, and asked, "But you have not told me how your mental machines operate; what is the secret?"

"It is not a secret to Earth, save in that they have not learned to use that knowledge. I see that your world learned many, many years ago—I cannot read the date in your mind—but they learned that all living things are radioactive.

"Oh—they learned that about 1930, didn't they!" exclaimed Wade, "And we never thought to investigate it, I guess."

"We did," continued Zezdon Afthen, "when it was discovered, and we learned a great deal from it. The radioactivity seemed to have some marked connection with the life processes.

"Study showed that it was intimately connected with the more typically nervous organisms. It seemed to be connected with the nervous impulse in some way. It was particularly evident in the higher animals, and with suitable instruments we began to find means of measuring rapid fluctuations, even getting oscillograph readings, showing the frequency. That gave us a lead, and from that basis, knowing the approximate frequency of mental impulses, we were able to design apparatus which could tune to such frequencies. Remember, the radioactive rays were merely the carrier waves, or, still better, the mere signals. The tube glows brighter when more power passes through it, though the light given off has no necessity of being, is of no use. So the radioactivity seemed but an accidental accompaniment of the real wave impulses. It may be that our own bodies had solved the secret of atomic energy, while we could not. Knowing what to tune for, we succeeded, in this apparatus we are wearing, to both catch and intensify it.

"Our race was too highly psychic, and too little mechanically curious. We learned too little of the world about, and too much of our own processes. We are a peaceful race, for, while you and the Ancient Masters learned the rule of existence in a world of strife, where only the fittest, the best fighters survived, we learned life in a carefully tended world, where the Ancient Masters taught us to live, where the one whose social instincts were best developed, where he who would most help the others, and the race, was permitted to live. Is it not natural that our race will not fight among themselves? The natural instincts that the dog of old had, has been weeded out. We are careful to suppress tendencies toward criminality and struggle. The criminal and the maniac, or those who are permanently incurable as determined by careful examination, are 're-moved' as the Leaders put it. Lethal gas." It was evident that Afthen did not greatly like this custom—but realized it was best.

"At any rate, we know so pitiably little of natural science. We were hopelessly helpless against an attacking science."

"I promise you, Afthen, that if Earth survives, Ortol shall survive, for we have given you all the weapons we know of, and we will give your people all the weapons we shall learn of." Morey spoke from the doorway. Arcot was directly behind him.

They talked for a short while, then Wade retired for some needed sleep, while Morey and Arcot started further work on the time fields.

Hour after hour the ship sped on through the dark of space, weirdly distorted, glowing spots of light before them, wheeling suns that moved and flashed as their awesome speed whirled them on.

They had to move slower soon, as the changing stars showed them near the space-marks of certain locating suns. Finally, as they hung motionless, barely moving, motionless to the quintillions of miles-distant suns, though still moving close to fifteen thousand miles per second, they saw the sun they knew was sun 3769-37,-478,326,894. It is now but a tiny spot of light in a tiny, distant constellation, but a ten-minute journey at the space speed brought them within the field of the gigantic star, twice as large as our sun, two and a half times as massive and twenty-six times as brilliant.

Thirteen major planets they counted as they searched the system with their powerful telectroscope, the outermost more than ten billion miles from the parent sun, while planet six, the one indicated by the world number, was at a distance of five hundred million miles, nearly as far from the sun as Jupiter is from ours, yet the giant sun, giving more than twenty-five times as much heat and light in the blue-white range, heated the planet to approximately the same temperature Earth enjoys. Spectroscopy showed that the atmosphere was well supplied with oxygen, and so the inhabitants were evidently oxygen-breathing men, unlike those of the Negrian people who lived in an atmosphere of hydrogen.

Arcot threw the ship toward the planet, and as it loomed swiftly larger, he shut off the space-control, and set the coils for full charge, while the ship entered the planet's atmosphere in a screaming dive, still at a speed of better than a hundred miles a second. But this speed was quickly damped as the ship shot high over broad oceans to the dull green of land ahead in the daylit zone. Observations made from various distances by means of the space-control, thus going back in time, showed that the planet had a day of approximately forty hours, the diameter was nearly nine thousand miles, which would probably mean an inconveniently high gravity for the terrestrians and a distressingly high gravity for the Ortolians, used to their world even smaller than Earth, with scarcely 80 per cent. of Earth's gravity.

At the speed they were now traveling, however, the centrifugal force was more than enough to support them, and they could not judge. Wade made some volumetric analysis of the atmosphere, and with the aid of a mouse, pronounced it "Q.A.R." (quite all right) for human beings. It had not killed the mouse, so probably humans would find it quite all right.

"We'll land at the first city that comes into view, and Afthen, you will be delegated as the spokesman, for you have a very considerable ability with the mental communication, and have a better understanding of the physics we need to explain than has Zezdon Fentes," suggested Arcot. They were now over land, a rocky coast that shot behind them as great jagged mountains, tipped with snow, rose beneath. The ship was traveling at a bare mile a second now, and the gravity of the planet was noticeable.

Suddenly, as a deep, long valley was under them, a shining apparition appeared from behind one of the neighboring hills, and drove down at them with an unearthly acceleration. Arcot moved just enough to dodge the blow, and turned to meet the ship. Instantly, now that he had a good view of it, he was certain it was a Thessian ship. Waiting no longer to determine that it was not a ship of this world, he shot a molecular beam at it. The beam exploded into a coruscating panoply of pyrotechnics on the Thessian shield. The Thessian replied with all his cosmics, and all other beams he had available, including a straight low-frequency heat-beam, an induction-beam, an intensely brilliant light-beam, and several molecular cannon with shells loaded with an explosive that was very evidently condensed light. This was no exploration ship, but a full-fledged battle-ship.

The *Ancient Mariner* was blinded instantly, though Arcot had the relux screens up. None of the occupants were hurt, but the combined pressure of the various beams hurled the ship to one side for all its tremendous mass. The induction beam alone was dangerous. It passed through the outer lux-metal wall unhindered, and the perfectly conducting relux wall absorbed it, and turned it into power. At once, all the metal objects in the ship began to heat up with terrific rapidity. Since there were no metallic conductors on the ship, no damage was done, save to the pans and tableware that happened to be in contact with relux walls.

Arcot immediately hid behind his perfect shield—the space-distortion.

"That's no mild dose, I must say," he said in a tense voice, working rapidly to restore the destroyed "eyes." "He's a real-for-sure battleship. Notice how that pilot dived, a lot more vigorously than the fellow on Ortol did. Better get down in the power room, Morey."

IN a few moments the ship was ready again. Opening the shield somewhat, Arcot was able to determine that no rays were being played on it, for no energy fields were disclosed as distorting the opened field, other than the field of the sun and planet.

Arcot opened it. The battleship was searching vainly and wildly about the mountains, and was now some miles distant. His last view of Arcot's ship had been a suddenly contracting ship, one that vanished in infinite distance, the infinite distance of another space, though he did not know it.

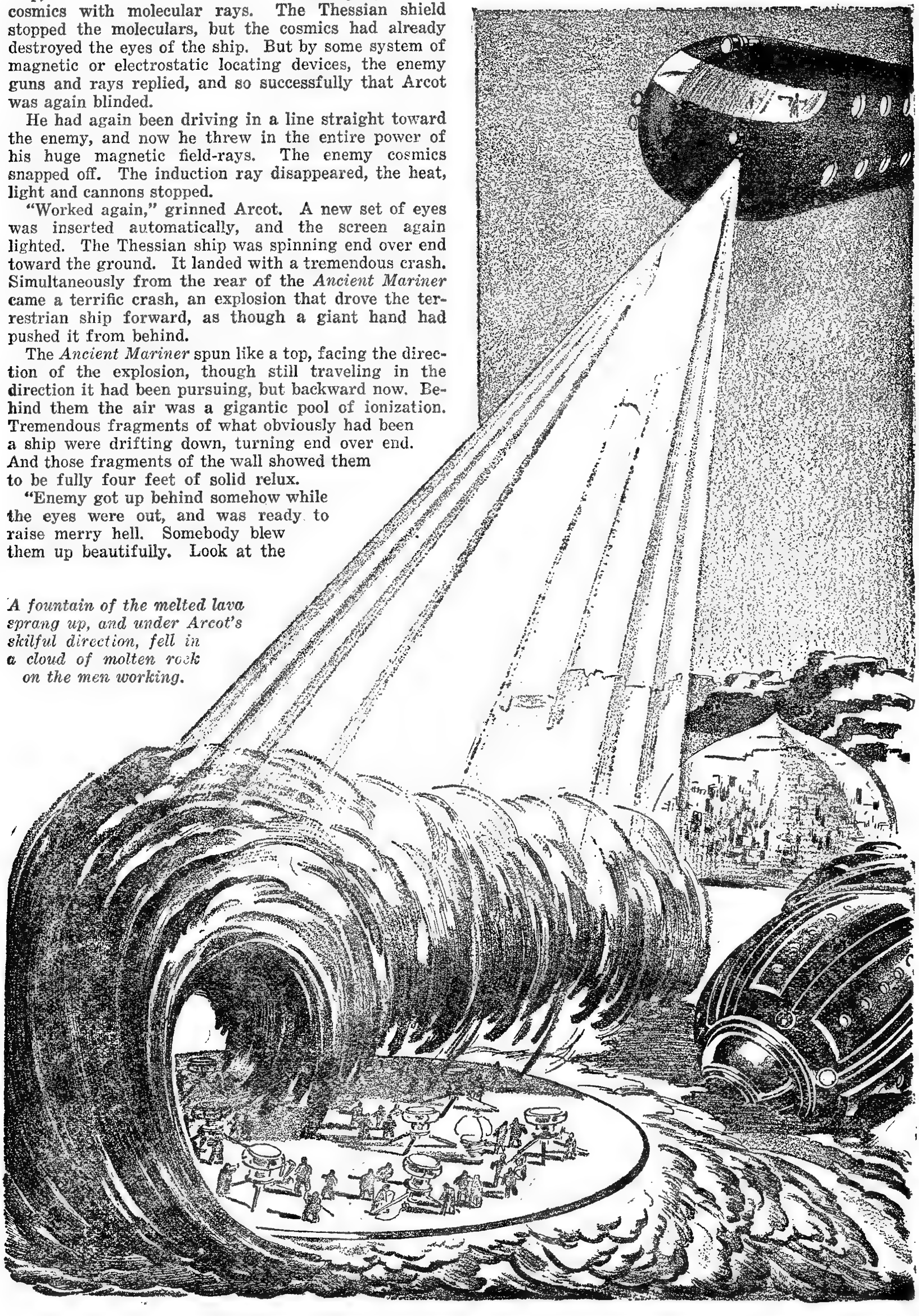
Arcot turned three powerful cosmics on the Thessian ship, and drove down toward it, accompanying the cosmics with molecular rays. The Thessian shield stopped the moleculars, but the cosmics had already destroyed the eyes of the ship. But by some system of magnetic or electrostatic locating devices, the enemy guns and rays replied, and so successfully that Arcot was again blinded.

He had again been driving in a line straight toward the enemy, and now he threw in the entire power of his huge magnetic field-rays. The enemy cosmics snapped off. The induction ray disappeared, the heat, light and cannons stopped.

"Worked again," grinned Arcot. A new set of eyes was inserted automatically, and the screen again lighted. The Thessian ship was spinning end over end toward the ground. It landed with a tremendous crash. Simultaneously from the rear of the *Ancient Mariner* came a terrific crash, an explosion that drove the terrestrian ship forward, as though a giant hand had pushed it from behind.

The *Ancient Mariner* spun like a top, facing the direction of the explosion, though still traveling in the direction it had been pursuing, but backward now. Behind them the air was a gigantic pool of ionization. Tremendous fragments of what obviously had been a ship were drifting down, turning end over end. And those fragments of the wall showed them to be fully four feet of solid relux.

"Enemy got up behind somehow while the eyes were out, and was ready to raise merry hell. Somebody blew them up beautifully. Look at the



A fountain of the melted lava sprang up, and under Arcot's skilful direction, fell in a cloud of molten rock on the men working.

ground down there—it's red hot. That's from the radiated heat of our recent encounter. Cosmics reflected, heat rays reflected, light bombs turned off, heat escaping from ions—nice little workout—and it didn't seriously bother our defenses of two-inch relux. Now tell me: what will blow up four-foot relux?" asked Arcot looking at the fragments. "It seems to me those fellows don't need any help from us; they may decline it with thanks. They wrecked that boat so quickly, we didn't even see it go."

"But they may be willing to help us, Man of Earth," replied Afthen," and we certainly need such help."

"I didn't expect to come out alive from that battleship there. It was luck. If they knew what we had, they could insulate against it in an hour," added Arcot.

"Let's finish those fellows over there—look!" From the wreck of the ship they had downed, a stream of men in glistening relux suits were filing. Any men comparable to humans would have been killed by the fall, but not Thessians. They carried peculiar machines, and as they drove out of the ship in a dive that looked as though they had been shot from a cannon, they turned and landed on the ground and proceeded to jump back, leaping at a sped that was bewildering, seemingly impossible in any living creature. Yet they did it.

Another group of men came out with more machines. They busied themselves quickly, setting them up. It took less than thirty seconds, and they had a large relux disc laid under the entire group and the machines. Arcot turned a molecular ray down. The rock and soil shot up all about them, even the ship shot up, to fall back into the great pit its ray had formed. But the ionization told of the ray shield over the little group of men. A cosmic reached down, while the men still frantically worked at their stubby projectors. The relux disc now showed its purpose. In an instant the soil about them was white hot, bubbling molten lava, huge blue hydrogen flames springing high from it. It was liquid, boiling furiously. But the deep relux disc simply floated on it. The enemy ship began sinking, and in a moment had fallen almost completely beneath the white hot rock.

A fountain of the melted lava sprung up, and under Arcot's skilful direction, fell in a cloud of molten rock on the men working. The suits protected, and the white hot stuff simply rolled off. But it was sinking their boat. Arcot continued hopefully.

A blazing cosmic reached out, and snapped out the eyes of the ship as they finished their work on one machine. Meanwhile a signaling machine was frantically calling for help and sending out information of their plight and position, and, most deadly to the terrestrians, the attack that had grounded them.

Then all was instantly wiped out in a single terrific jolt of the magnetic beam. The machines jumped a little, despite their weight, and the ray shield apparatus slumped suddenly in blazing white heat, the interior mechanism fused. But the men were still active, and rapidly spreading from the spot, each protected by a ray shield pack.

A brilliant stab of molecular ray shot at each from either of two of the *Ancient Mariner's* projectors as Morey aided Arcot. Their little packs flared brilliantly for an instant under the thousands of horsepower of energy lashing at the screen, then flashed away, and the opalescent relux yielded a moment later, and the figure went twisting, hurtling away. Meanwhile Wade was busy with the magnetic apparatus, destroying shield after shield, which either Arcot or Morey picked off. The fall from even so much as half a mile seemed not sufficient to seriously bother these super-men, for an instant later they would be up tearing away in great leaps on their own power as their molecular suits, blown out by the magnetic field, failed them.

It was but a matter of minutes before the last had been chased down either by the rays or the ship. Then, circling back, Arcot slowly settled beside the enemy ship, that one still in fair repair, the shattered fragments of the one which simply disappeared in a burst of heat could not be called a ship.

"Wait," called Arcot sharply as Morey started for the door. "Don't go out yet. The friends who wrecked that little sweetheart who crept up behind will probably show up. Wait and see what happens." Hardly had he spoken, when a strange apparition rose from behind a rock scarcely a quarter of a mile away. Immediately Arcot intensified the vision screen covering him. He seemed to leap near. There was one man, and he held what was obviously a sword by the blade, above his head, waving it from side to side.

"There they are—whatever they are. Intelligent all right—what more universally obvious peace sign than a primitive weapon such as a knife held in reverse position? You go, Morey, or I will, with Zezdon Afthen. Try holding a carving knife by the blade. We don't carry swords."

Morey grinned as he got into his power suit, on Wade's O.K. of the atmosphere. "They may mistake me for the cook out looking for dinner," he pointed out with a long face, "and I wouldn't risk my dignity that way. I'll take the base-ball bat and hold it wrong way round instead."

Nevertheless, as he stepped from the ship, with Afthen close behind, he held the long knife by the blade, and Aften, very awkwardly operating his still rather unfamiliar power suit, followed with the reversed bat. "It seems that you have picked a weapon still more primitive than the knife, but, unfortunately, a club works very well either way round," remarked Afthen smilingly.

Into the intensely blue sun-light the men stepped. Their skin and clothing took on a peculiar tint under the strange sunlight. The effect was far less pronounced than that of the mercury ion, or mercury vapor lamp, but noticeably distorted colors.

The single stranger was joined by a second, also holding a reversed weapon, and together they threw them down. Morey and Zezdon Afthen followed suit. The two parties advanced toward each other. Morey could tell from Zezdon Afthen's thoughts that this occasion was decidedly impressive to him, for it was the second time in the history of their world that one of their men had landed on the planet of another system.

The strangers advanced with a swift, light step, jumping from rock to rock, while Morey and Afthen flew part way toward them. The men of this world were totally unlike any intelligent race Morey had conceived of. Their head and brain case was so small as to be almost animalish. The nose was small and well formed, the ears more or less cupshaped with a remarkable and, to terrestrians, almost comical power of motion. Their eyes were large, dark brown spots in tiny faces, seemingly huge, but probably no larger than a Terrestrian's or those of an Ortolian, though in the tiny head they were necessarily closely placed, protected by heavy boney ridges that actually projected from the skull to enclose them. Tiny, childlike chins completed the head, running down to a thin, apparently scrawny neck, though no doubt quite large enough in relation to the head.

They were short, scarcely five feet, yet evidently of tremendous strength for their short, heavy arms, the muscle bulging plainly under the tight rubber-like composition garments, and the short legs whose stocky girth proclaimed equal strength were members of a body in keeping with them. The deep, broad chest, wide, square shoulders, heavy broad hips, combined with the tiny head seemed to indicate a perfect incarnation of brainless, brute strength.

"Strangers from another planet, enemies of our enemies, you must be our friends. What brings you here at this time of troubles?" The thoughts came clearly and forcefully from the stocky individual before them, belying his apparent lack of mental organization.

"We seek to aid, and to find aid. The enemy that attacks you, attacks us. We are not of the same planet, nor is he who stands beside me of my planet. The menace that you face, attacks not alone your world, nor your system, but all this star cluster," replied Zezdon Afthen steadily.

The stranger stood, thoughtful, a moment. At last he shook his head with an evident expression of hopelessness in the diminutive features. "The menace is even greater than we feared. We cannot help you. It was just fortune that permitted us to have our weapon in workable condition at the time your ship was attacked. It will be a day before the machine will again be capable of successful operation. When in condition for use, it is invincible, but—one blow in thirty hours—(*Hours* was the natural interpretation for Morey, as the thought was "twenty of the time units into twenty-four of which a day is divided," and their day was forty hours) so you can see we are not of great aid," he shrugged.

How hopeless was their position! An enemy with evident resources of tremendous power, deadly, unknown rays that wiped out entire cities with a single brief sweep—and no defense save this single weapon, good but once a day! Morey could read the utter despair of the man.

"What is the difficulty?" askey Morey eagerly.

"Power," exploded the man. "Power, lack of power. The utter necessity of war-power, electric power—there is practically none. Our cities are going without power, factories are shut down, while every electric generator on the planet is pouring its output into the accumulators that work these damnable, hopeless things. Invincible with power—helpless without."

"Ah!" Morey's face shone with delight—invincible weapon—with power. And the *Ancient Mariner* could generate unthinkable power. Perhaps enough.

"What power source do you use—how do you generate your power?" The fact of mental telepathy was now a thing so familiar to Morey that he scarcely realized he was not speaking aloud.

"Combining oxidizing agent with reducing agent releases heat. Heat used to boil the liquid metal (mercury, of course, thought Morey), and the vapor runs turbines. Condensers boil hydrogen oxide, this used to drive other turbines, and——"

"We can give you power. What wattage have you available?" Only Morey's thoughts had to translate "watts" to "How many man-weights can you lift through your height per time interval, equal to this." He gave the man some impression of a second, by counting. The man figured rapidly. His answer indicated that approximately a total of two billion kilowatts were available.

"Then the weapon is invincible hereafter, if what you say is true, provided your apparatus is good for a thousand times that load in so far as transportation of power goes. Our ship alone can easily generate ten thousand times that power.

"Come, get in the ship, accompany us to your largest city, or the capital."

The men turned, and retreated to their position behind the rocks, while Morey and Zezdon Afthen waited for them. Soon they returned, and entered the ship.

"Our world," explained the leader rapidly, "is a single unified colony. The capital is 'Shesto,' our world we call 'Talso.'" His directions were explicit, and Arcot started for Shesto, on Talso.

CHAPTER VIII

Undefeatable or Uncontrollable?

FIFTEEN minutes after they started, they came to Shesto. They were forced to land, and explain, for their relux ship was decidedly not the popular Talsonian idea of a life-saver. Three cities had been destroyed in the day and half the Thessian forces had been here. The people had scattered to the country for the most part, where less concentration made Talso less vulnerable.

Shesto was defended by two of the machines, whatever they were, and each machine had been equipped with two fully charged accumulators. Their four possible shots were hoped to be sufficient protection, and, so far, had been. The city had been attacked twice, according to Tho Stan Drel, the Talsonian who had conducted them hither. Once by a single ship which had been instantly destroyed, and once by a fleet of six ships. The interval had permitted time to recharge, in part, the discharged accumulator, and the fleet had been badly treated. Of the six ships, four had been brought down in rapid succession, for it was decided to throw all on one chance of making the Thessians retreat in fear. It had worked, and the remaining two ships had fled.

That was on the previous evening. When the first city had been wiped out, with a loss of life well in the hundreds of thousands, the other cities had, to the limit of their abilities set up the protective apparatus. Two cities were destroyed since. Apparently the Thessians were holding off for the present.

They landed at Shesto, after Tho Stan Drel had succeeded in getting in touch with military authorities and secured guarantee of safe passage into the city.

"In a way," said Morey seriously as the Talsonian returned, "it was distinctly fortunate that we were attacked almost at once. Their instantaneous system of destruction would have worked for the one shot needed to send the *Ancient Mariner* to eternal blazes." He laughed, but it was a slightly nervous laugh as he thought of the consequences of going directly to some city with their ship, obviously a space ship, and obviously of design similar to that of the Thessian ships.

The Terrestrial ship landed in a great grassy court, and out of respect for the parklike smoothness of the turf, Arcot left the ship on its power units, suspended a bit above the surface. Then he, Morey and the Talsonian left the ship. Zezdon Afthen was left with the ship and with Wade in charge, for if some difficulties were encountered, Wade would be able to help them with the ship, and Zezdon Afthen with the tremendous power of his thought locating apparatus, was busy seeking out the Thessian stronghold, as yet undetermined. He was using the thought of the "magnetic beam" as a clue in searching for them, for only their own party and the Thessians could know of it on this world. The sending apparatus which the survivors of the wrecked ship had set up had, without doubt, sent that important news to the base.

A party of men of Talso, their tiny heads and powerful, heavy bodies clothed in uniforms, met the Terrestrians outside the ship.

"Welcome, Men of another world, and to you go our thanks for the destruction of one of our enemies." The clear thoughts of the spokesman evinced his ability to concentrate.

"And to your world must go our thanks for the saving of our lives, and more important, our ship. For the ship represents a thing of enormous value to our world. And, we think, to this entire star-system," replied Arcot.

"We, as the military authorities, have met you, but unlike the military authorities of years past, we are ready to recognize that this is not a war of men, but a war of knowledge of Nature and her works. We have learned only the handling of men, those who have learned the handling of Nature must speak with you, that you may be understood.

"I see—understand—your—thoughts that you wish to learn more of this weapon we use. You understand that it is undefeatable? It is a question among us as to whether it is undefeatable, uncontrollable or just ununderstandable. We have had fair success with it. It is not a weapon, was not developed as such; it was an experiment in the line of electric-waves. How it works, what it is, what happens—we do not know.

"But men who can create so marvelous a ship as this of yours, capable of destroying a ship of the Thessians ("enemy from other worlds" were his thoughts) with their own weapons must certainly be able to understand any machine we may make—and you have power?" he finished eagerly.

"Practically infinite power. I will throw into any power line you suggest, all the direct current you wish, but right in that fact, that it is direct current, not alternating, is no doubt the greatest trouble, for I doubt if you have rotary converters capable of handling any tremendous power, and interrupters would not be able to handle any great power—unless made of relux, and we can't make any relux for you. No apparatus." Arcot's thoughts were pure reflection, but the Talsonian brightened at once.

"I feared it might be alternating—but we can handle direct current. All our transmission is done at high voltage direct current. What potential do you generate? Will we have to install changers?"

"We generate D.C. at any voltage up to fifty million, any power up to ———— that is needed to lift ten trillion men through their own height in this time." The time was a second, and the power represented approximately twenty trillion horsepower.

The Talsonian's face went blank with amazement as he looked at the ship. "In that tiny thing you generate such power?" he asked in amazement.

"In that tiny ship we generate more than one thousand times that power directly as electric current when we wish, and in all, can generate more than one million times that power, or 20,000,000,000,000,000,000 horsepower," smiled Arcot.

"Our power troubles are over," declared the military man emphatically.

"Our troubles are not over," replied a civilian who had joined the party, with equal emphasis. "As a matter of fact, they are worse than ever. More tantalizing. What he says means that we have a tremendous power source, but it is in one spot. How are you going to transmit the power? We can't possibly move any power anywhere near that amount. We couldn't touch it to our lines without having them all go up in one instantaneous blaze of glory. Every changer in the system would blow up, before the circuit relays could move. Even the accumulators would break down under the first jolt of anything like that.

"We cannot drain such a lake of power through our tiny power pipes of silver ware," said the Talsonian excitedly, and yet obviously partly in awe of the power Arcot had mentioned.

"This man is Stel Felso Theu, the greatest of our scientists, the man who has invented this weapon which alone seems to offer us hope. And I am afraid he is right. See, there is the University. For the power requirements of their laboratories, a heavy power line has been installed, and it was hoped that you could carry leads into it." His face showed evident despair greater than ever.

"We can always feed some power into the lines. Let us see just what hope there is. I think that it would be wiser to investigate the power lines at once," suggested Morey.

TEN minutes later, the military staff having retired, and but a single officer now accompanying them, other than Tho Stan Drel, the Terrestrial scientist, and the Talsonian scientist were inspecting the power installation.

They had entered a large stone building, into which and from which led numerous very heavy silver wires. Evidently silver replaced copper on this world. The insulators were evidently silicate glass. Their height suggested a voltage of well over one hundred thousand, and such heavy cables suggested a very heavy amperage, so that a tremendous load was expected.

"No," answered Stel Felso Theu, in reply to Arcot's question, "we do not expect to use any such terrific power, but at times we find a very heavy amperage needed in an experiment, and at times a heavy amperage is not wanted, but great voltage is, so we use these heavy wires, and the high insulation. It will permit a tremendous power, but we have never had use for it, of course."

Entering the building, the Terrestrians stopped in amazement. Completely filling the building were a series of gigantic glass tubes, their walls fully three inches thick, and even so, braced with metal supports that looked suspiciously like heavy platinum rods. Inside the tubes were tremendous elements such as the tiny tubes of their machine carried. Great cables led into them, and now their heating coils were glowing a somberly deep red. Little coronas surrounded the leads from the tubes at one end of the room.

Along the walls were the switchboards, dozens of them, all sizes, all types of instruments, strange to the eyes of the Terrestrians, and in practically all the light-beam indicator system was used, no metallic pointers, but tiny mirrors directing a very fine line of brilliant light acted as a needle. The system thus had practically no inertia.

"Are these the changers?" asked Arcot gazing at the gigantic tubes.

"They are, each tube will handle up to a hundred thousand times the potential of zinc-copper in the acid of the yellow powder," said Stel Felso Theu. One hundred thousand times the potential of a copper-zinc cell in copper sulphate solution would be of the order of 110,000 volts. This was a thing as universal as the elements themselves. In any world this was true, though their system of correlating work-units by man-weights through man-heights was not a very accurate comparison, for though the Thessians, for instance, were not over three feet high, at most, and probably shorter than that, for it was exceedingly difficult to judge their height from a distance, their world was evidently very large, and subject to a great gravitational attraction. To such men, the man system would mean little. Further, Arcot had learned from the Ortolians, who had performed some autopsies on their corpses, that their bones were not of stone, as ours are, but of practically pure iron, as are the "bones" of a skyscraper. Certainly the apparent weight of a man would be misjudged by a terrestrian, and probably the weight of these men had been misjudged—but the zinc-copper sulphuric-acid couple was free from such error.

Arcot inspected the tubes with intense interest. If these people had developed *real* power tubes such as these, perhaps they could make for him real power tubes for molecular motion units. With the screens and rays driven by such tubes——

But he quickly realized that that could not be. The sheer capacity of the elements of these tubes would preclude the production of the necessary high frequencies.

That tubes could be made to act as direct current voltage transformers, much as the magnetic induction transformers for changing the voltage from alternating current circuits, had been known for centuries on Earth, but before the tubes had been developed, alternating current had been so developed as to make the transfer to the more manageable direct current useless, and economically unwise. They had never used the system of Talso on Earth.

"But I fear, Stel Felso Theu, that these tubes will carry power only one way; that is, it would be impossible for power to be pumped from here into the power house, though the process can be reversed," pointed out Arcot anxiously. "Radio tubes work only one way, which is why they can act as rectifiers. The same was true of these tubes. They could carry power one way only.

"True, of tubes in general," replied the Talsonian, "and I see by that that you know the entire theory of our tubes, which is rather abstruse."

"We use them on the ship, in special form," interrupted Arcot.

"Then I will only say that the college here has a very complete electric power plant of its own, and on special occasions, such as this, the power generated here is frequently needed by the city, and so we arranged the tubes with switches which could reverse the flow. At present they are operating to pour power into the city.

"If your ship can generate such tremendous power, I suspect that it would be wiser to eliminate the tubes from the circuit, for they put certain restrictions on the line. Remember the line is designed for operation at either high voltage or amperage. The main power plant in the city has tube banks capable of handling anything the line would. I suggest that your voltage be set at the maximum that the line will carry without break-down, and the amperage can be made as high as possible without heat loss."

"Good enough—with this exception. Because of our super-abundance and cheapness of power, there is no need to avoid heat loss. We can run the line dull red. Silver won't oxidize, and the lines are not insulated save by glass, and if the heating is slow, as it inevitably will be, the glass will not crack. The line to the city power will stand what pressure?"

"It is good for the maximum of these tubes, or 100,000 copper-zinc units," replied the Talsonian.

"Then get into communication with the city plant and tell them to prepare for—", Arcot studied the lines carefully, making due allowance for the superior conductance of silver, and allowing for heating, "100,000 such units of pressure, and—", another pause as Arcot translated amperes to copper plating units, "a current capable of plating about fifty times this mass of copper out in one second." Arcot handed him a small bar of lux metal he had brought with him. The Talsonian immediately dropped it as its enormous density surprised him with too little muscular effort in his arm. He glanced at it in amazement as he picked it up with some difficulty and weighed it in his hand, again doing mental arithmetic.

"That represents about seven hundred million horsepower," gasped the Talsonian. "Can you give us so much? Why, nothing on Talso could possibly stand that power!"

"Well, tell them to get ready for every work-unit they can carry, I'll get the generator." Arcot turned, and flew on his power suit to the ship while the Talsonians stared after him in amazement.

"A little pack on his back contains the same type of driving unit the ship uses, and is capable of lifting about a ton under full load—about over eight times his weight," explained Morey in answer to their surprised glances.

ARCOT disappeared in the ship. In a few moments he was back, a molecular pistol in one hand, and suspended in front of him on nothing but a ray of ionized air, to all appearances, a cylindrical apparatus, with a small cubical base. From the base protruded a tremendously heavy relux clamp, and another from the end of the cylinder on top. Both were set in cups of lux metal insulators.

The cylinder was about four feet long, and the cubical box about eighteen inches on a side.

"What is that, and what supports it?" asked the Talsonian scientists in surprise.

"The thing is supported by a ray which directs the molecules of a small bar in the top clamp, driving it up," explained Morey, answering his last question first, "and that is the generator."

"That! Why it is hardly as big as a man!" exclaimed the Talsonian in disappointment.

"Nevertheless, it can generate something in the neighborhood of a billion horsepower. But you couldn't get the power away if you did generate it." He turned toward Arcot, and called to him.

"Arcot—set it down and let her rip on about half a million horsepower for a second or so. Air arc. Won't hurt it—she's made of lux and relux."

Arcot grinned, and set it on the ground. "Make an awful hole in the ground."

"Oh—go ahead. It will satisfy this fellow, I think," replied Morey.

Arcot pulled a very thin lux metal cord from his pocket, and attached one end of a long loop to one tiny switch, and the other to a second. Then he adjusted three small dials. The wire in hand, he retreated to a distance of nearly two hundred feet, while Morey warned the Talsonians back. Arcot pulled one end of his cord.

Instantly a terrific crashing roar nearly deafened the men, a solid sheet of blinding flame enveloped the little machine, and a mighty tongue of blue flame reached in a flaming cone into the air for nearly fifty feet. The flame was a bit lop-sided, since the one contact was on one side of the base. The terrific screeching roar continued for a moment, then the heat was so intense that Arcot could stand no more, and pulled the cord. The flame died instantly, though a slight ionization clung for a moment. The little machine was scarcely visible, its blue was so intense that the eyes were endangered. In a moment it had cooled to white, and was cooling slowly through orange—red deep— red—

The grass for thirty feet about was gone, the soil for ten feet about was molten, boiling. The machine itself was in a little crater, half sunk in boiling rock.

The Talsonians stared in amazement. Then a sort of sigh escaped them and they started forward. Arcot raised his molecular pistol, and a blue green ray reached out, and the rock suddenly was black. It settled swiftly down, and a slight depression was the only evidence of the terrific action.

Arcot walked over the now cool rock, cooled by the action of the molecular ray. In driving the molecules downward, the work was done by the heat of these molecules. The machine was evidently frozen in the solid lava.

"Brilliant idea, Morey," said Arcot disgustedly. "Now we have a nice job breaking it loose.

Morey stuck the lux metal bar in the top clamp, walked off some distance, and snapped on the power for an instant. The rock immediately about the machine was molten again. A touch of the molecular pistol to the lux metal bar, and the machine jumped free of the molten rock.

"I'll hold it—clean it with cosmics."

"Use your head—that's relux, it'll simply throw cosmics all over the place. Turn it on," replied Arcot cheerily.

Indeed, the reflected cosmics would have been dangerous to plant life in the neighborhood, though the men could easily have retreated into a position where they wouldn't be hit by them. But Morey did turn it on, and left it on longer this time. The noise was terrific, the air was a ball of fire for thirty feet around it, but the infusible, indestructible relux and lux were not disturbed, and the molecular ray functioned nicely, holding it where it was. In a very short time Morey felt quite sure that it was clean, for no rock could stay in that inferno without volatilizing instantly. He shut off the power. The machine was perfectly clean, and extremely hot.

"And your ship is made of that stuff!" exclaimed the Talsonian scientist. "What will destroy it?"

"Your weapon will, apparently. Also the molecular ray we used will change the reflective material into the clear material. We had to be careful not to have the ray touch the machine.

"But do you believe that we have power enough?" asked Morey with a smile.

"No—it's entirely too much. Can you tone that condensed lightning bolt down to a workable level?"

CHAPTER IX

The Irresistible and the Immovable

THE generator Arcot had brought was one of the two spare generators used for laboratory work. He took it now into the sub-station, and directed the Talsonian students and the scientist in the task of connecting it into the lines; though they knew where it belonged, he knew *how* it belonged.

It was nearly a quarter of an hour before the power company was prepared to receive the enormous flow of power Arcot promised. Then the Terrestrian turned on the power, and gradually increased it until the power authorities were afraid of breakdowns. The leads to the generator were glowing a very rull red, and the long leads to the main power plant were decidedly warm. But the city plant itself was the limiting factor, for there was a limit to what power they could carry. The accumulators were charged in the city, and the power was being shipped to other cities whose accumulators were not completely charged.

But, after giving simple operating instructions to the students, Arcot and Morey went with Stel Felso Theu to his laboratory.

"Here," he explained, "is the original apparatus. All these other machines you see are but replicas of this. How it works, why it works, even what it does, I am not sure of. Perhaps you will understand it. The thing is fully charged now, for it is, in part, one of the defenses of the city. Examine it now, and then I will show its power."

Interestedly Morey and Arcot looked at a large glass tube surrounded with a battery of terrifically powerful electro-magnets, and several huge condenser-plates. Evidently both electro-static and electro-magnetic fields were used here. Arcot looked it over in silence, following the great silver leads with silent interest. Finally he straightened, and returned to the Talsonian. In a moment Morey joined them.

"I will now start the apparatus." The Talsonian threw a switch, and an intense ionization appeared within the tube, then a minute spot of light was visible within the sphere of light. "The minute spot of radiance is the real secret of the weapon. The ball of fire about is merely wasted energy.

"Now I will bring it out of the tube." There were three dials on the control panel from which he worked, and now he adjusted one of these. The ball of fire moved steadily toward the glass wall of the tube, and with a crash the glass exploded inward. It had been highly evacuated. Instantly the tiny ball of fire about the point of light expanded to a large globe.

"It is now in the outer air. We make the—thing, in an evacuated glass tube, and can only release it by destroying the tube, but as they are cheap, it is not an expensive procedure. The ball will last in its present condition for approximately three hours. Feel the exceedingly intense heat? It is radiating away its vast energy.

"Now here is the point of greatest interest." Again the Talsonian fell to work on his dials, watching the ball of fire, and the almost invisible intensely bright spot of light in its center. It seemed far more brilliant in the air now. It moved, and headed toward a great slab of solid steel off to one side of the laboratory. It shifted about until it was directly over the center of the great slab. The slab rested on a scale of some sort, and as the ball of fire touched it, the scale showed a sudden increase in load. The ball sank into the slab of steel, and the scale showed a steady, enormous load. Evidently the little ball was pressing its way through as though it were a solid body. In a moment it was through the steel slab, and out on the other side.

"It will pass through any body with equal ease. It seems to answer only these controls, and these it answers perfectly, and without difficulty.

"One other thing we can do with it. I can increase its rate of energy discharge. I will do so."

The Talsonian turned a fourth dial, well off to one side, and the brilliance of the spot increased enormously. The heat was unbearable. Almost at once he shut it off.

"That is the principle we use in making it a weapon. Watch the actual operation."

The ball of fire shot toward an open window, out the window, and vanished in flying trail of ions far in the sky above. The Talsonian stopped the rotation of the dials. "It is motionless now, but scarcely visible. I will now release all the energy." He twirled the fourth dial, and instantly there was a flash of light, and a moment later a terrific concussion.

"It is gone." He left the controls, and went over to his apparatus. He set a heavy silver bladed switch, and placed a new tube in the apparatus. A second switch arced a bit as he drove it home. "Your generator is recharging the accumulators."

The accumulators were exactly that; they were a huge series of condensers. They were being charged now in readiness for another "shot." Arcot and Morey returned to the machine and examined it carefully now, and very curiously. Stel Felso Theu took the backplate of the control cabinet off, and the Terrestrians looked at the control with interest.

"Got it, Morey?" asked Arcot after a time.

"Think so. Want to try making it up? We can do so out of spare junk about the ship, I think. We won't need the tube if what I believe of it is true."

"Q.A.R.—We'll do it. Come on." Arcot turned to the Talsonian. "We wish you to accompany us to the ship. We have apparatus there which we wish to set up."

Back to the ship they went, and into the mathematics room. There Arcot, Morey and Wade worked rapidly on the machines, setting up equations and functions. The Ortolians showed the Talsonian the ship to the best of their abilities, and explained fully the nature of their attackers, and the mission that had brought the Terrestrians to their planet.

It was about three-quarters of an hour later when Arcot and his friends called the others to the laboratory. They had a maze of apparatus on the power bench, and the shining relux conductors ran all over the ship apparently. One huge bar ran into the power room itself, and plugged into the huge power-coil power supply.

They were still working at it, but looked up as the others entered. "Guess it will work," said Arcot with a grin.

There were four dials, and three huge switches. Arcot set all four dials, and threw one of the switches. Then he started slowly turning the fourth dial. In the center of the room a dim, shining mist of a foot diameter began to appear. It condensed, solidified without shrinking. In less than a minute it was a solid ball of matter a foot in diameter. It was strange, utterly strange. It seemed black, but was a perfectly reflective surface—and luminous!

"Then—then you had already known of this thing? You had it on your own world? Then why did you not tell me when I tried to show it," said the Talsonian.

Arcot was sending the globe, now perfectly nonluminous, about the room. It flattened out suddenly, and was a disc. He tossed a small weight on it, and it remained fixed, but began to radiate slightly. Arcot readjusted his dials, and it ceased radiating, held perfectly motionless. The sphere returned, and the weight dropped with a metallic clang to the floor. Arcot maneuvered it about for a moment more. Then he placed his friends behind a screen of relux, and increased the radiation of the globe tremendously. The heat became intense, and he stopped the radiation.

"No, Stel Felso Theu, we do not have this on our world, but it is a marvelous thing. May I use it in our defense?" asked Arcot.

"You do not have it! You do not have it, yet you look at my apparatus for fifteen minutes, and then work for an hour—and you have apparatus far more effective than ours, which required years of development!" exclaimed the Talsonian.

"Ah, but it was not wholly new to me. This ship is driven by curving space into peculiar coordinates.

"Even so, we didn't do such a hot job, did we, Morey?"

"No, we should have——"

"What—it was not a good job? And you succeeded in creating it in air—in making it stop radiating, in making a ball a foot in diameter, made it change to a disc, made it carry a load—what do you want?" interrupted the Talsonian explosively.

"We want the full possibilities, the only things that can save us in this war. You do not know the full possibilities? Then learn the cosmic force you played with, was let loose on your enemies. No wonder their mighty ships were wrecked under its awful powers!" Morey spoke swiftly, excitedly.

"What you learned how to do was the reverse of the process we learned. How you did it is a wonder—but you did. Very well—matter is energy—does your physics know that?" asked Arcot.

"It does; matter contains vast energy. Energy has mass, just as matter has," replied the Talsonian.

"Matter has mass, and energy because of that! Mass is energy. Mass is the measure of energy; it is energy. Energy in any known form is a field of force in space. Matter—the gravitational field in space represents its energy—but it is its energy. Light—light has a mass, and that mass a gravitational field. Magnetism—is a field itself. Electrostatic energy—a field between charged bodies. The electric current—besides the mass field of the electron is the electrostatic field, though it is hard to distinguish one from the other, and when the electron moves, there is a magnetic field.

"So matter is ordinarily a combination of magnetic, electrostatic and gravitational fields. Your apparatus combined the three, and put them together. The result was—matter!

"You created matter. We can destroy it, but we cannot create it.

"What we ordinarily call matter, the substance, is just a marker, a sign that there are those energy-fields. Each bit is surrounded by a gravitational field. The bit is just the marker of that gravitational field."

"But that seems to be wrong. This artificial matter of yours seems also a sort of knot, for you make all three fields, combine them, and have the real matter, but the little spot that we call matter is not, very apparently, like normal matter. Normal matter also has a draw-string effect. It holds the fields that make it. The artificial matter is surrounded by the right fields, but it is evidently not able to hold the fields, as normal matter does. That was why your matter continually disintegrated to ordinary energy. The energy was not bound properly.

"That I haven't worked out—that is one of the things that has made my experiment unsuccessful. I was able to hold the energy by very nearly forcing more in.

"But the reason why it would blow up so was obvious. It did not take much to destroy the slight hold that the artificial matter had on its fields, and then it instantly proceeded to release all its energy at once. And as you poured millions of horsepower into it all day to fill it, it naturally raised merry hell when it let loose."

Arcot was speaking eagerly, excitedly.

"But here is the great fact, the important thing: It is artificially created in a given place. It is subject absolutely to the forces that make it. It is made, and exists at the point determined by these three coordinate dials. It is not natural, and can exist only where it is made. The thing is hard to explain. Its principle is that the stuff exists where it is made, and nowhere else—obvious, but important. It cannot exist save at the point designated. Then, if that point moves along a line, to continue existence, the artificial matter must follow that moving point and be always at that point. Suppose now that a slab of steel is on that line. The point moves to it—through it. To exist, that artificial matter MUST follow it through the steel—and if not, it is destroyed. Then the steel is attempting to destroy the artificial matter. If the matter has sufficient energy, it will force the steel out of the way, and penetrate. The same is true of any other matter, lux metal or relux—it will penetrate. To continue in existence it must. And it has great energy, and will expend every erg of that energy of existence to continue existence.

"It is, as long as its energy holds out, absolutely irresistible!

"But similarly, if it is at a given point, it must stay there, and will expend every erg staying there. It is then immovable! It is either irresistible in motion, or immovable in static condition. It is the irresistible and the immovable!

"What happens if the irresistible meets the immovable?" Arcot finished with a smile? "It can only fight with its energy of existence, and the more energetic prevails."

CHAPTER X

Improvements and Calculations

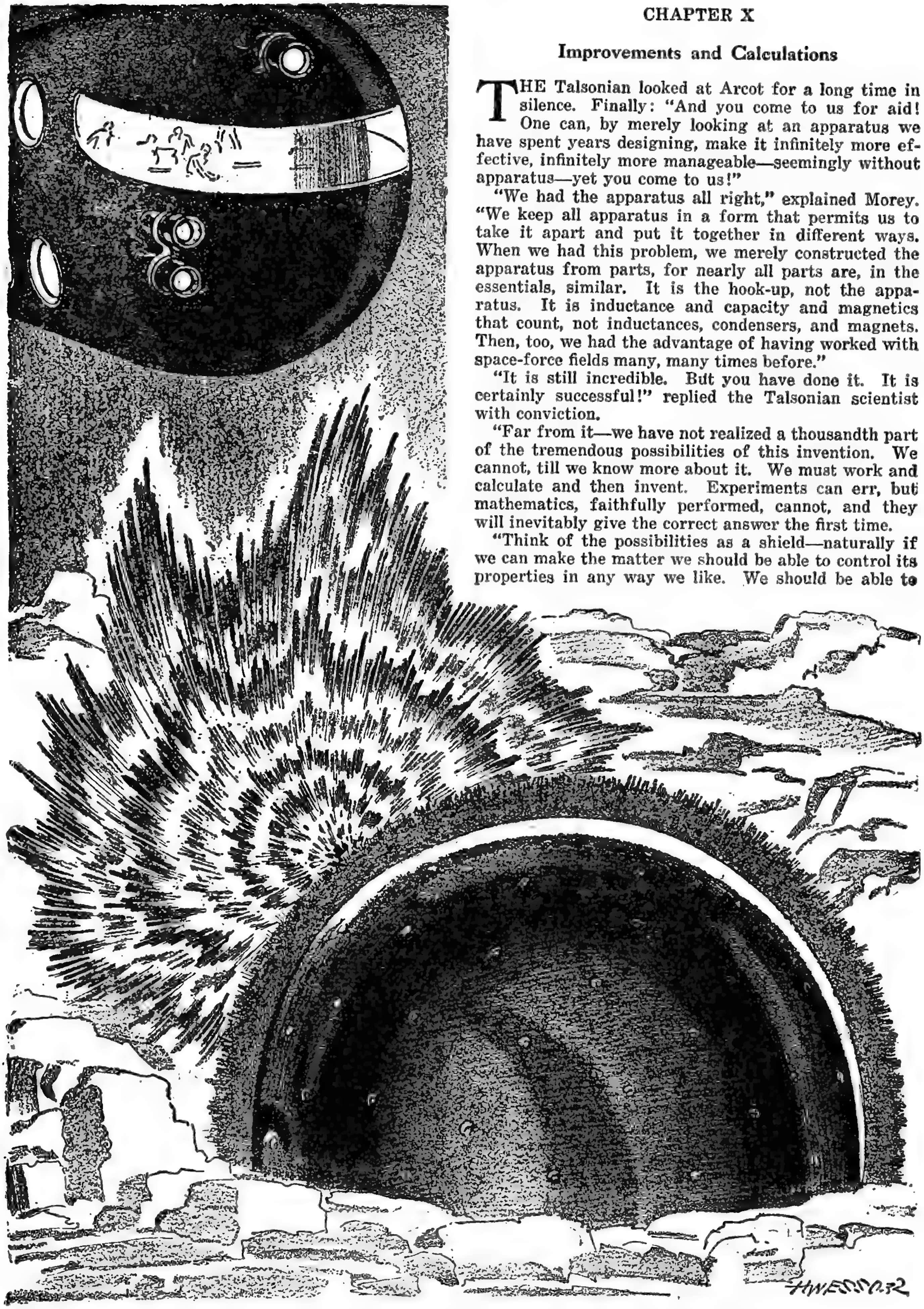
THE Talsonian looked at Arcot for a long time in silence. Finally: "And you come to us for aid! One can, by merely looking at an apparatus we have spent years designing, make it infinitely more effective, infinitely more manageable—seemingly without apparatus—yet you come to us!"

"We had the apparatus all right," explained Morey. "We keep all apparatus in a form that permits us to take it apart and put it together in different ways. When we had this problem, we merely constructed the apparatus from parts, for nearly all parts are, in the essentials, similar. It is the hook-up, not the apparatus. It is inductance and capacity and magnetics that count, not inductances, condensers, and magnets. Then, too, we had the advantage of having worked with space-force fields many, many times before."

"It is still incredible. But you have done it. It is certainly successful!" replied the Talsonian scientist with conviction.

"Far from it—we have not realized a thousandth part of the tremendous possibilities of this invention. We cannot, till we know more about it. We must work and calculate and then invent. Experiments can err, but mathematics, faithfully performed, cannot, and they will inevitably give the correct answer the first time.

"Think of the possibilities as a shield—naturally if we can make the matter we should be able to control its properties in any way we like. We should be able to



It exploded with a terrific concussion as it hit the wall of the ray screen.

make it opaque, transparent, red, green, blue, violet—any color. We should be able to make it transparent to ultra-violet and opaque to cosmics. Cosmics would tend to destroy the artificial matter, but the matter would in turn expend its energy in maintaining its existence. Then—attach to this the idea I have already mentioned." Arcot was speaking more to Morey now. "Do you remember, when we were caught in that cosmic ray field in space when we first left this universe, that I said that I had an idea for energy so vast that it would be impossible to describe its awful power? I mentioned that I would attempt to liberate it if ever there was need? The need exists. I am going to seek that secret—and if I find it, nothing in all this space will ever resist it—I think." He added: "Don't want to be too sure." Which was wise.

Stel Felso Theu was looking out through the window at a group of men excitedly beckoning. He called the attention of the others to them, and himself went out. Arcot and Wade joined him in a moment.

"They tell me that Fellsheh, well to the poleward of here, is being attacked. In fact, though they have used four of their eight shots, they are still being attacked," explained the Talsonian gravely.

"Well, get in," snapped Arcot as he ran heavily back to the ship. Stel Felso hastily followed, and the *Ancient Mariner* shot into the air, above the city, and darted away, poleward, to the Talsonian's directions. The ground fled behind them at a speed that made the scientist grip the hand-rail with a tenseness that showed his nervousness.

It seemed hours, however, before the battle-front came into view. As they approached, a tremendous concussion, and a great gout of light in the sky informed them of the early demise of several Thessians. But a real fleet was clustered about the city. Arcot approached low, and was able to get quite close before detection. His ray screen was up, and Morey had charged the artificial matter apparatus, small as it was, for operation. He created a ball of substance outside the *Ancient Mariner*, and thrust it toward the nearest Thessian, just as a molecular hit the *Ancient Mariner's* ray screen.

The artificial matter instantly exploded with terrific violence, slightly denting the tremendously strong lux metal walls. The pressure of the light was so great that the inner relux walls were dented inward. The ground below was suddenly, instantaneously fused.

"Lord—they won't pass a ray screen, obviously," he muttered, picking himself up from where he had fallen as the ship leaped violently.

"Hey—easy there. You blinked off the ray screen, and our relux is seriously weakened," called Arcot, a note of worry in his voice.

"No artificial matter with the ray screen up. I'll use the magnet," called Morey.

He quickly shut off the apparatus, and went to the huge magnet control. The power room was crowded, and now that the battle was raging in truth, with three ships attacking simultaneously, even the enormous power capacity of the ship's generators was not sufficient, and the storage coils had been thrown into the operation. Morey looked at the instruments a moment. They were all up to capacity, save the ammeter from the coils. That wasn't registering yet. Suddenly it flicked, and the other instruments dropped to zero. They were in artificial space.

"Come here, will you, Morey," called Arcot. In a moment Morey joined his much worried friend.

"That artificial matter control won't work through ray screens. The Thessians never had to protect against moleculars here, and didn't have them up—hence the destruction wrought. We can't take our screen down, and we can't use our most deadly weapon with it up. If we had a big outfit, we might throw a screen around the whole ship, and sail right in. But we haven't."

"Well, it was getting too hot for us. We can't stand ten seconds against that fleet, save with our wall up, and neither of us can hurt the other this way. I'm going to find their base, and make them yell for help." Arcot snapped a tiny switch one notch further for the barest instant, then snapped it back. They were close to a hundred thousand miles from the planet as he opened the screen. Instantly he set to work, but straightened with a laugh, and threw the ship several million miles from the planet. "Quicker," he explained, "to simply follow those ships back home—go back in time."

With the telectroscope, he took views at various distances, thus quickly tracing them back to their base at the pole of the planet. Instantly Arcot shot down, reaching the pole in less than a second, by careful maneuvering of the space device.

A gigantic dome of polished relux rose from rocky, icy plains. The thing was nearly half a mile high, a mighty rounded roof that covered an area almost three-quarters of a mile in diameter. Titanic—that was the only word that described it. About it there was the peculiar shimmer of a molecular ray screen. They could not see within the enclosure, for the relux turned back all light, yet they knew that within were the Thessian garrison.

Morey looked a minute, then grinned. He darted to the power room and again set his apparatus into operation. He created a ball of matter outside the ship, the ray screen now down, and hurled it instantly at the fort. It exploded with a terrific concussion as it hit the wall of the ray screen. Almost instantly a second one followed, weighing nearly half a pound. The concussion was terrifically violent, the ground about was fused, and the ray screen was opened for a moment. Arcot threw all his moleculars on the screen, as Morey sent bomb after bomb at it. The coils supplied the energy, and the violent concussions rocked the un-fused ground, cracked the ice about, and the rock beneath. Each energy release disrupted the ray-screen for a moment, and the concentrated fury of the molecular beams poured through the opened screen, and struck the relux behind. It glowed opalescent now in a spot twenty feet across. But the relux was thick—tremendously thick, and it lasted. Thirty bombs Morey hurled, while cosmics from the fort played on the relux protection of the *Ancient Mariner*. Their eyes were destroyed, but they were motionless, and they held their position without difficulty, pouring their bombs and rays at the fort.

Arcot threw the ship into space, moved, and reappeared suddenly nearly three hundred yards further on. A snap of the eyes, and he saw that the fleet was approaching now. He went again into space, and retreated. Discretion was the better part of valor. But his plan had worked.

HE waited half an hour, and returned. From a distance the telectroscope told him that one lone ship was patroling outside the fort. He moved toward it, creeping up behind the icy mountains. The ship seemed to loom suddenly before him, and his magnetic beam reached out. The ship lurched and fell. The magnetic beam reached out toward the fort, from which a molecular ray had reached already, tearing up the icy waste which had concealed him. The ray-screen stopped it, while again Morey turned the magnetic beam on—this time against the fort. The ray remained on! Arcot retreated hastily.

"They found the secret, all right. No use, Morey, come on up," called the pilot. "They evidently put magnetic shielding around the apparatus. That means the magnetic beam is no good to us any more. They will certainly warn every other base, and have them install similar protection."

"Why didn't you try the magnetic ray on the occasion of our first attack?" asked Zezdon Afthen curiously.

"If it worked, I didn't want it to, and I suspected it wouldn't. If it had worked, their sending apparatus would have been destroyed, and no message could have been sent to call their dogs off of Fellsheh and our plan would have been unsuccessful. By forcing them to recall their fleet I got results I couldn't get by attacking the fleet.

"I think there is little more I can do here, Stel Felso Theu. I will take you to Shesto, and there make final arrangements till my return—if ever, with apparatus capable of overthrowing your enemies. If you wish to accompany me—you may." He glanced around at the others of his party. "And our next move will be to return to Earth with what we have. Then we will investigate the Sirian planets, and learn anything they may have of interest, thence—to the real outer space, the utter void of inter-galactic space, and an attempt to learn the secret of that enormous power," finished Arcot.

"Terrestrian, why do you need greater power than the enormous powers you have shown me?" asked Stel Felso Theu.

For answer, Arcot lead him to the laboratory, and there picked up two small electro-magnets, connecting them to the power lines, one drawing five amperes and the other ten. He arranged them so that the north poles of each were adjacent. A powerful repulsive action was set up.

"Stel Felso Theu, take these, and push them together slowly," he suggested, handing him the magnets. The Talsonian took them curiously, and pushed them slowly toward each other. The repulsive force between them grew steadily as they approached, greater—greater—then it stopped increasing, and began to decline very rapidly, till at last it was practically zero. Then, for the last half inch, there was a pull between them.

He looked curiously at Arcot.

"At first they repel, then as they come nearer, the repulsion grows, but as they come still nearer the stronger tends to reverse the polarity of the weaker, and they struggle, the weaker struggling to maintain its identity. They come nearer, and the forces are slowly struggling in a death battle, the weaker steadily losing to the greater. They come nearer, and the weaker completely loses its polarity in the greater field of the stronger, and now, just a piece of steel, it is attracted, its identity lost.

"The force with the lesser power has been overcome, its identity lost, finally completely destroyed by the greater power. It is power that conquers. They each fought with the same weapons, but the greater power inevitably won. If we can get vast power—we need no great weapons."

They returned to Shesto, and there Arcot arranged that the only generator they could spare, the one already in their possession, might be used till other Terrestrian ships of the *Ancient Mariner* type, designed for their use in commerce with Nansaland and Sator in that other Island Universe Arcot and his friends had visited, could bring more.

Then they left for Earth. Hour after hour they fled through the utter void, till at last old Sol was growing swiftly ahead of them, and finally Earth itself was large on the screens. Stel Felso Theu looked on with vast interest as the strange planet loomed larger and still larger on the distorted view-screen. Finally they changed to a straight molecular drive, and dropped to the Vermont field from which they had taken off.

During the long voyage, Morey and Arcot had both spent much of their time working on the time-distortion field, till at last it was finished, and plans were drawn up for installation of an apparatus which would give them a tremendous control over time, either speeding or slowing their time rate enormously. At last, this finished, they had worked on the artificial matter theory, and developed considerable of the theory, at least to the point where they could control the shape of the matter perfectly, though as yet they could not control the exact nature. The possibility of such control was, however, definitely proven by the results the machines had given them. Arcot had been more immediately interested in the control of form. He could control the nature as to opacity or transparency to all vibrations that normal matter is opaque or transparent to. Light would pass, or not as he chose, but cosmics he could not stop nor would radio or moleculars be stopped by any present shield he could make.

The relux making the inner lining of the *Ancient Mariner* was distinctly weakened, and this they could not repair; neither were they able to have an inner coat put on. However, Arcot hoped that the power room and the pilot room might have an outer sheath of relux applied in time. Their time on Earth would be short, less than a day, but perhaps——

They had signalled, as soon as they slowed outside the atmosphere, for a landing, and when they settled to the field, Arcot senior and a number of very important scientists had already arrived. More were coming as Arcot met his father on the field.

Arcot senior greeted his son very warmly, but he was worried, tremendously worried, as his son soon saw.

"WHAT'S happened, Dad, won't they believe your statements?"

"They doubted when I went to Luna for a session with the Interplanetary Council, but before they could say much, they had plenty of proof of my statements," he answered with a wry smile. "News came that a fleet of Planetary Guard ships had been wiped out instantaneously by a fleet of ships from outer space. They were huge things—nearly half a mile in length. The Guard ships went up to them—fifty of them—and tried to signal for a conference. The white ship was instantly wiped out—we don't know how. They didn't have ray screens, but that wasn't it. Whatever it was—slightly luminous ray in space—it simply released the energy of the lux metal and relux of the ship. Being composed of light energy simply bound by photonic attraction, it let go with terrible energy. We can do it slowly in a special apparatus. They can do it almost instantly from a distance. Only one ship had the ray apparatus. The other Guards at once let loose with all their moleculars and cosmics. The enemy screen shunted off the moleculars, the cosmics blinded the big ray-ship, but the others sent moleculars and wiped out the Guard almost instantly.

"Of course, I could explain the screen, which was new, but not the detonation ray. I am inclined to believe from other casualties that the destruction, though reported as an instantaneous explosion, was not that. Other ships have been destroyed, and they seemed to catch fire, and burn, but with terrific speed, more like gun powder than coal. It seems to start a spreading decomposition, the ship lasts perhaps ten minutes. If it went instantly, the shock of such a tremendous energy release would disrupt the planet.

"At any rate, the great fleet separated, twelve went to the North Pole of Earth, twelve to the south, and similarly twelve to each pole of Venus. Then one of them turned, and went back to wherever it had come from, to report. Just turned and vanished. Similarly one from Venus turned and vanished. That leaves twelve at each of the four poles, for, as I said, there were an even fifty.

"They all followed the same tactics on landing, so I'll simply tell what happened in Arctica. In the North they had to pick one of the islands a bit to the south of the pole. They melted about a hundred square miles of ice to find one.

"The ships arranged themselves in a circle around the place, and literally hundreds of men poured out of each, and fell to work with machines. In an inconceivably short time, their motions were exceedingly rapid, they had set up a number of machines, the parts coming from the ships. These machines at once set to work, and they built up a relux wall. A tiny ship watched from direct vision range, but the main observation was done from telectroscope machines at great distance. That wall, according to both parties, was at least six feet thick! The machines that made the relux, placed it. The floor was lined with thick relux as well as the roof, which is simply a continuation of the wall in a perfect dome. They had so many machines working on it, that within twenty-four hours they had it finished, while huge masses of water had been drawn in to supply the machines.

"We attacked twice, once in practically our entire force, with some ray-shield machines. The result was, as I had predicted, disastrous. The second attack was made with ray shielded machines only, and little damage was done to either side, though the enemy were somewhat impeded by masses of ice hurled into their position by cosmics. All the workers wore relux suits, and the separate ships resting threw out a ray shield. The combined screens protected the workers. Their relux disintegration ray was conspicuous by its absence.

"Yesterday—seems a lot longer than that, son—they started it again. They'd been unloading it from the ship evidently. We had had ray-shielded machines out, but they simply melted. They went down, and Earth retreated. They're in their fortress now. We don't know how to fight them. Now, for God's sake, tell us you have learned of some weapon, son!" The older man's face was lined and deadly serious as he pleaded for some encouraging word. His iron gray head showed his fatigue due to hours of concentration on his work.

"Some," replied Arcot junior briefly. He glanced around. Other men had arrived, men he knew, whom he met in his work, or at meetings of the American Association for the Advancement of Science. But there were Venerians here, too, in their protective suits, insulated against the cold of Earth, deadly to them, and against its dissecting-room atmosphere.

"First, though, gentlemen, allow me to introduce Stel Felso Theu of the planet Talso, one of our allies in this struggle, and Zezdon Afthen and Fentes of Ortol, which, as you already know, is one of our other allies.

"As to progress, I can say only that it is in a more or less rudimentary stage. We have the basis for great progress, a weapon of inestimable value—but it is only the basis. It must be worked out. I am leaving with you today the completed calculations and equations of the time field, the system used by the Thessian invaders in propelling their ships at a speed greater than that of light. Also, the uncompleted calculations in regard to another matter, a weapon which our ally, Talso, has given us, in exchange for the aid we gave in allowing them the use of one of our generators. Unfortunately the ship could not spare more than the single generator. I strongly advise rushing a number of generators to Talso in intergalactic freighters. They badly need power—power of respectable dimensions.

"I have stopped on Earth only temporarily, and I want to leave as soon as possible. I intend, however, to attempt an attack on the Arctic base of the Thessians, in strong hopes that they have not armoured against one weapon that the *Ancient Mariner* carries—though I sadly fear that old Earth herself has played us false here. I hope to use the magnetic beam, but Earth's polar magnetism may have forced them to armor, and they may have sufficiently heavy material to block the effects. As yet, no ship can have reached them from Talso, where they have already set up a base, for I believe our system is more rapid than theirs."

In this belief Arcot was wrong. His maximum speed *was* greater, due to the peculiar practical considerations. A time control permitted full speed across space, since they at all times had perfect vision. The distortion of light due to speed was automatically rectified by their time fields; therefore they did not have to run at less than one-fifth full speed, whereas Arcot was forced to run at less than one-fifth full speed. A ship had already arrived, and the Thessians were working on complete magnetic protection.

MOREY distributed the papers which had been made out upon the time field, and the incomplete calculations on the artificial matter, while Arcot already had a ground crew servicing the ship. He gave designs to machinists on hand to make certain control panels for the large artificial matter machine. The *Ancient Mariner's* store rooms were crowded with machinery, many very valuable cubic feet of storage space being sacrificed. The new "Mariner Type" machines being constructed had required the peculiar energy storage coils used in storing power for the space distortion apparatus, and many were on hand. Practically a third bank was installed, and charged at the maximum rate of the ship's huge generators while Morey, Arcot and Wade got some badly needed sleep.

At least the danger of human interference with their plans was negligible. No human could hope for gain through an overt action, only some fanatic that felt "Called of God" to see that the Earth was "punished for its sins" could be expected to interfere—and did. One genius threw a tremendously powerful chemical explosive bomb under one side of the *Ancient Mariner.* It made a large pit in the landing field, killed one man and injured three others. The *Ancient Mariner* was slightly shifted as the ground gave way to the explosive. It takes more than chemical explosives to injure six inches of lux metal.

Nevertheless, in six hours, Arcot had announced himself ready, and a squadron of Planetary Guard ships were ready to accompany the re-fitted *Ancient Mariner.*

They approached the pole cautiously, and were rewarded by the hiss and roar of ice melting into water, which burst into steam under a cosmic ray. A molecular followed. They were coming from an outpost of the camp, a tiny dome under a great mass of ice. But the dome was of relux. A molecular reached down from a Guard ship—and the Guard ship crumbled suddenly as dozens of moleculars from other points hit it.

"They know how to fight this kind of a war. That's their biggest advantage," muttered Arcot. Wade merely swore.

"Ray screens, no moleculars," snapped Arcot into the transmitter. He was not their leader, but they saw his wisdom, and the squadron commander repeated the advice as an order. In the meantime, another ship had fallen. The dome had its screen up, allowing the multitudes of hidden stations outside to fight for it. They were bathed in cosmics, that melted their icy cover, and dozens of the miniature forts came into view.

"Hmm—something to remember—when terrestrians have to retire to forts. They will, too, before this war is over. That way the main fort doesn't have to lower its ray screen to fight," commented Arcot. He was watching intensely as a tiny ship swung away from one of the larger machines, and a tremendously powerful molecular started biting at the fort's ray screen. The ship seemed nothing but a flying ray projector, which was what it was.

As they had hoped, the deadly new ray stabbed out from somewhere on the side of the fort. It was not within the fort.

"Which means," pointed out Morey, "that they can't make stuff to stand that. Probably the projector would be vulnerable."

But a barrage of cosmics, which immediately followed back the brilliant beam of ionization, had no apparent effect. The little radio-controlled molecular beam projector lay on the rock under the melted ice, blazing incandescent with the rapidly released energy of the relux.

"Now to try the real test we came here for," Morey clambered back to the power room, and turned on the controls of the magnetic beam. The ship was aligned, and then he threw the last switch. The great mass of the machine jerked violently, and plunged forward as the beam attracted the magnetic core of the Earth.

Morey could not see it, but almost instantly the shimmer of the molecular screen on the fort died out. The deadly ray sprang out from the Thessian projector—and went dead. A cosmic ray started—and went dead. Frantically the Thessians tried weapon after weapon, and found them dead almost as soon as they were turned on—which was the natural result in the terrific magnetic field.

And these men had iron bones, their very bones were attracted by the beam; they plunged upward toward the ship as the beam touched them, but, accustomed to the enormous gravitational accelerations of an enormous world, most of them were not killed.

The molecular screen of the fort down, several of the Guard ships made the mistake of using their own molecular rays, which exposed them to the attacks of the little outskirt forts, as their screens were lowered. Arcot turned the ship now, and the magnetic beam played on one after another of the miniature forts, with dire results. One after another went dead, and leaping figures scurried from them, their packs alone protecting them. But there were too many. And while one existed, no ship could lower its screen to attack the fort.

"Ah—" exclaimed Arcot. He picked up the transmitter and spoke again to the Squadron Commander. "Squadron Commander Tharnton, what relux thickness does your ship carry."

"Inch and a quarter," replied the surprised voice of the commander instantly.

"Any of the other ships carry heavier?"

"Yes, special solar investigator carries five inches. One alone. What shall we do?"

"Tell him to lower his screen, and let loose at once on all operating forts. His relux will stand for the time needed to shut them down for their own screens, unless some genius decides to fight it out. As soon as the other ships can lower their screens, tell them to do so, and tell them to join in. I'll be able to help then. My relux has been burned, and I'm afraid to lower the screen. It's mighty thin already."

The Squadron Commander was smiling joyously as he relayed the advice as a command.

Almost at once a single ship, blunt, an almost perfect cylinder, lowered its screen. In an instant the opalescence of the transformation showed on it, but its dozen ray projectors were at work. Fort after fort glowed opalescent, then flashed into protective ionization of screening. Quickly other ships lowered their screens, and joined in. In a moment more, the forts had been forced to raise their screens for protection. Still, many of the ships were fighting blind, their "eyes" gone under cosmics.

Now at last a barrage of moleculars struck the six-foot relux of the fort. Arcot grinned. "They won't get far in that." Wade took over the ship, and Arcot retired to the new artificial matter room, and started the screen there. A chance cosmic wiped out the eyes. Another set flashed into action—and revealed the fort protected by the merged fields of the Thessian ships within. The ship rocked under another jolt of the magnetic beam, and in several places the screen fell.

A disc of artificial mater ten feet across suddenly appeared beside the *Ancient Mariner*. It advanced with terrific speed, struck the great dome of the fort, and the dome caved, bent in, bent still more—but would not puncture. The disc retreated, became a sharp cone, and drove in again. This time the point smashed through the relux, and made a small hole. The cone seemed to change gradually, melting into a cylinder of twenty foot diameter, and the hole simply expanded. It continued to expand as the cylinder became a huge disc, a hundred feet across, set in the wall. The juncture of the wall and disc was a blazing inferno of released energy as the disc expanded.

Suddenly it simply dissolved. There was a terrific roar, and a mighty column of white rushed out of the gaping hole. Figures of Thessians caught by the terrific current came rocketing out. The inside was at last visible. The terrific pressure was hurling the outside line of ships about like thistledown. The *Ancient Mariner* reeled back under the tremendous blast of expanding gas. The snow that fell to the boiling water below was not water, *in toto*, but some was carbon dioxide—and some oxygen chilled in the expansion of the gas. It was snowing within the dome. The falling forms of Thessians were robbed of the life-giving air pressure to which they were accustomed. But all this was visible for but an instant.

Then a small, thin sheet of the artificial matter formed beside the fort, and advanced on the dome. Like a knife cutting open an orange, it simply went around the dome's edge, cutting through it. Half way around—three quarters—and the great dome lifted like the lid of a teapot under the enormous gas pressure remaining—then dropped under its own weight.

The artificial matter was again a huge disc. It settled over the exact center of the dome—and went down. The dome caved in. It was crushed under a load utterly inestimable. Then the great disc, like some monstrous tamper, tamped the entire works of the Thessians into the bed-rock of the island. Every ship, every miniature fort, every man was caught under it—and annihilated.

The disc dissolved. A terrific barrage of cosmics played over the island, and the rock melted, flowed over the ruins, and left only the spumes of steam from the Arctic ice, rising from a red-hot mass of rock, containing a boiling pool.

The Battle of the Arctic was done. Arcot turned the machine south.

CHAPTER XI

"Write Off the Magnet"

"SON," said Dr. Arcot senior's voice over the radio communicator, "that was a marvelous demonstration of energy controlled for destructive purposes. Thett has lost one base in this system.

"But," his voice continued seriously, "it still has three others and—while you were fighting there to the North, the South, too, witnessed a battle. Capetown was wiped out. They did not use the merciful death ray, nor the molecular. They are a vindictive people. They burned the entire city with low concentration cosmics, while guard ships watched helplessly."

Morey's comments were brief, relating principally to the future consignment of the Thessian race. Arcot turned to his transmitter and called the Squadron Commander.

"You heard? Capetown wiped out. Let's see what we can do with the South Polar base."

"Squadron Commander Tharnton speaking: Squadron 73-B of Planetary Guard will follow orders from Dr. Arcot directly. Heading south to Antarctica at maximum speed," droned the communicator, but under the official tone of command was a note of suppressed rage and determination. "And the Squadron Commander wishes Dr. Arcot every success in wiping out Antarctica as thoroughly and completely as he destroyed the Arctic base—and may all Thessians be eternally damned. My wife lived in Capetown."

The flight of ships headed south at a speed that heated them white in the air, thin as it was at the hundred mile altitude, yet going higher would have taken unnecessary time, and the white heat meant no discomfort. They reached Antarctic in about ten minutes. The Thessian ships were just entering through great locks in the walls of the dome. At the first sight of the terrestrial ships they turned, and shot toward the guard-ships. Their screens were down, for, armored as they were with very heavy relux, they expected to be able to overcome the tersestrial thin relux before theirs was seriously impaired.

"Ships will put up screens," Arcot spoke sharply—a new plan had occurred to him. The moleculars of the Thessians struck glowing screens, and no damage was done. "Ships, in order of number, will lower screen for thirty seconds, and concentrate all moleculars on one ship—the leader. Solar investigator will not join in action."

The flagship of the squadron lowered its screen, and a tremendous bombardment of rays struck the leading ship practically in one point. The relux glowed, and the opalescence shifted with bewildering, confusing colors. Then the terrestrial ship's screen was up, before the Thessians could concentrate on the one unprotected ship. Immediately another Terrestrial ship opened its screen and bombarded the same ship. Two others followed—and then it was forced to use its screen.

But suddenly a terrestrial ship crashed. Its straining screen had been overworked—and it failed.

Arcot's magnetic beam went into action. A huge Thessian battleship staggered, and fell, its screen down. It crashed heavily on the icy, tumbled hillside. A door opened and long lines of men filed from it, quickly setting up apparatus on the ice. The Dome fort was not as yet actively fighting, save with cosmics which did little damage, but did annoy. It was easy to keep behind some Thessian ship, and so be out of range of the blinding rays.

Morey, with Arcot's aid, was systematically wrecking the propulsive engines of the Thessian ships. But a few were left in the air when they changed their tactics, and charged down on the terrestrial ships. Three guard ships were changed to masses of bent, distorted relux under the ship bombardment. It was almost impossible to dodge the terrific charges, for the vastly greater accelerations which the Thessians used, made it like the strike of a snake.

A Thessian ship loomed suddenly huge beside the *Ancient Mariner*. Arcot touched the switch—and they were alone in space. Alone—save for a great chunk of relux which drifted swiftly against the lux walls, only to bounce off. Arcot looked at it in puzzled wonder. It was the cap of a Thessian ship, the very tip of the nose. It was one solid piece of relux easily ten feet thick.

"Designed for ramming, I see. But even it gave way when we went into space—and that bow was too near. Too bad we can't use that system, but we can't get near the Dome, because of the new ray, and the ships won't stand still long enough for us."

Ten seconds later Arcot reappeared. All the Thessian ships were on the ground! A blazing mass of incandescence explained these tactics. Another ship was suddenly afire under the deadly ray.

"Down — beside a Thessian" commanded Arcot sharply. He himself retreated again into space.

"Tactics—while their friends were in the air. They couldn't use it of course. Now what?"

Arcot reappeared, aligned the ship almost instantly, and Morey threw on the magnet. The deadly ray did not go out—it flickered, dimmed, but was apparently as deadly as ever.

"Shielded—write off the magnet, Morey. That is one asset we lose."

Arcot, protected in space, was thinking swiftly. Moleculars—useless. They had to keep their own screens up. Cosmics—against relux! Hopeless. Artificial matter—bound in by their own molecular screen! And the magnet had failed them against the protected mechanism of the dome. The ships were not as yet protected, but the dome was.

"Guess the only place we'd be safe is under the ground—way under!" commented Wade drily.

"Under the ground—Wade, you're a genius!" Arcot gave a shout of joy, and told Wade to take over the ship. He called Morey into session, while Wade looked in blank wonderment. He had apparently been very brilliant, but just how he didn't as yet see.

"Take the ship back into normal space, head for the hill over behind the Dome, and drop behind it. It's solid rock, and even their rays will take a moment or so to move it. As soon as you get there, drop to the ground, and turn off the screen. No—here, I'll do it. You just take it there, land on the ground, and shut off the screen. I promise the rest!" Arcot dived for the artificial matter room.

THE ship was suddenly in normal space; its screen up. The dog-fight had been ended. The terrestrial ships had been completely defeated. The *Ancient Mariner's* appearance was a signal for all the moleculars in sight. Ten huge ships, half a dozen small forts, and the now unshielded Dome, joined in. Their screen tubes heated up violently in the brief moment it took to dive behind the hill, a tube fused, and blew out. Automatic devices shunted it, another tube took the load—and heated. But their screen was full of holes before they were safe for the moment behind the hill.

Instantly Wade dropped the defective screen. Almost as quickly as the screen vanished, a cylinder of artificial matter surrounded the entire ship. The cylinder was tipped by a perfect cone of the same base diameter. The entire system settled into the solid rock, making it flow like mud under the enormous pressure of artificial matter. The heat generated by the escaping energy aided somewhat, as they sank in a moment a quarter of a mile into solid rock. The rock above cracked and filled in behind them. The ship was suddenly pushed by the base of the cylinder behind them, and they drove on through the rock, the cone parting the hard granite ahead. They went perhaps half a mile, then stopped. In the light of the ship's windows, they could see the faint mistiness of the inconceivable hard, artificial matter, and beyond the slick, polished surface of the rock it was pushing aside. The cone shape was still there.

There was a terrific roar behind them, the rock above cracked, shifted and moved about.

"Raying the spot where we went down," Arcot grinned happily.

A reddish glow came from behind. "Cosmic now." The reddish color grew swiftly, became orange, and the rock slumped into white lava.

The cone and cylinder merged, shifted together, and became a sphere. The sphere elongated upward, and the *Ancient Mariner* turned in it, till it, too, pointed upward. The sphere became an ellipsoid.

Suddenly the ship was moving, accelerating terrifically. It plowed through the solid rock, and up—into a burst of light. They were *inside* the dome. A great rent in the floor behind them told the secret of their presence. Great ships were berthed about the floor. Huge machines bulked here and there—barracks for the men—everything.

The ellipsoid shrank to a sphere, the sphere grew a protuberance which separated and became a single bar-like cylinder. The bar shot toward a huge machine on one side, passed through it, turned, and reversed. The machine released a flood of cosmic rays. They hit the dome wall, were reflected and re-reflected, a burning, awful flood of cosmic rays. Many of the structures were made of natural elements, and these added to the horror by sending out great tongues of flame, floods of radiation of their own, of burning hydrogen.

The bar turned, and drove through the great dome wall. A little hole—but it whirled rapidly around, sliced the top off neatly and quickly. Again, like a gigantic teapot lid, the whole great structure lifted, settled, lifted, settled, and stayed there. Men, scrambling wildly toward ships, suddenly stopped, seemed to blur and their features ran together horribly. They fell—and were dead in an instant as the air disappeared. In another instant they were solid blocks of ice, for the temperature was below the freezing point of carbon dioxide.

The giant tamper set to work. The Thessian ships went first. Their cold tubes were rapidly becoming effective as occasional weak moleculars testified. But they were all crumpled, battered wrecks in a few seconds of work of the terrible disc.

The dome was destroyed. Arcot tried something else. He put on his control machine the equation of a hyperboloid of two branches, and changed the constants gradually till the two branches came close. Then he forced them against each other. Instantly they fought, fought terribly for existence. A tremendous blast of light and heat exploded into being. Two tons of lead had been used to charge the coils that fed them. The energy of two tons of lead attempted to maintain those two branches. It was not, fortunately, explosive, and it took place over a relux floor. Most of the energy escaped into space. The vast flood of light was visible on Venus, despite the clouds.

But it fused most of Antarctica. It destroyed the last traces of the camp in Antarctica.

"Well—the Squadron was wiped out I see." Arcot's voice was flat as he spoke. The Squadron—twenty ships —four hundred men.

"Yes—but so is the Arctic camp, and the Antarctic camp, as well," replied Wade. He knew Arcot, and at present Arcot was about ready to start off on a single handed punitive expedition. That had happened once. Arcot had seen three husky interplanetary dock-hands hold up a little old lady, and take from her some two hundred dollars. "My funeral money" she had called it. Arcot caught the dock-hands, and when the police arrived they were all taken to the station. The dock-hands were there for treatment; Arcot was held on a charge of assault and battery.

"What next, Arcot. Shall we go out to intergalactic space at once?" asked Morey, coming up from the power room.

Arcot steadied himself, and grinned at his friends. "You win, I guess I was about to lose my temper. I was about to start for Venus and finish the job.

"No, we'll go back to Vermont, and have the time-field stuff I ordered installed, then go to Sirius, and see what they have. They moved their planets from the gravitational field of Negra, their dead, black star, to the field of Sirius—and I'd like to know how they did it. Then—Intergalactia." He started the ship toward Vermont, while Morey got into communication with the field, and gave them a brief report.

"We knew what had happened," replied the Commander in charge at the field, "for there were ships out in space watching on the telectroscope. Relayed to us. But we didn't know how it had been done. So you drilled through about a mile of solid rock. We need that machine. Don't wreck it on the way up here!"

CHAPTER XII

Sirius

THEY didn't wreck it on the way up. They landed about half an hour later, and Arcot simply went into the cottage, and slept—with the aid of a light soporific. Morey and Wade finished the job of directing the disposition of the machines, while Dr. Arcot senior really finished the job. The machines would be installed in less than ten hours, for the complete plans Arcot and Morey had made, with the modern machines for translating plans to metal and lux had made the actual construction quick, while the large crew of men employed required but little time.

When Arcot and his friends awoke, the machine was ready. They swam in the near-by lake a bit, ate, and made final preparations for departure.

"Well, Dad, you have the plans for all the machines we have. I expect to be back in two weeks. In the meantime you might set up a number of ships with very heavy relux walls, walls that will stand rays for a while, and equip them with the rudimentary artificial matter machines you have, and go ahead with the work on the calculations. Thett will land other machines here—or on the moon. Probably they will attempt to ray the whole Earth. They won't have concentration of ray enough to move the planet, or to seriously chill it. But life is a different matter—it's sensitive. It is quite apt to let go even under a very mild ray. I think that a few exceedingly powerful ray screen stations might be set up, and the Heavyside Layer used to transmit the vibrations entirely around the Earth. You can see the idea easily enough. If you think it worth while—or better, if you can convince the thickheaded politicians of the Interplanetary Defence Commission that it is—.

"Beyond that, I'll see you in about two weeks," Arcot turned, and entered the ship.

"The question is," he added a bit later, as the ship left Earth beneath, "Will I?"

"At least you saw him then. I wish Dad had been able to get up. The Commission kept him too busy, and you kept me too busy," remarked Morey, half ruefully, half caustically.

"I have no power to read the future with accuracy, Terrestrians," interrupted Zezdon Afthen, who alone of the Ortolians had joined them at Vermont," but I can read it to this extent: who has not his mind on the business in hand, does not long have himself upon it."

"True enough, Afthen.

"I'll line up for Sirius and let go." Arcot turned the ship now, for Earth was well behind, and lined it on Sirius, bright in the utter black of space. He pushed his control to "½," and the space closed in about them. Arcot held it there while the chronometer moved through six and a half seconds. Sirius was at a distance almost planetary in its magnitude from them. Controlling directly now, he brought the ship closer, till a planet loomed large before them—a large world, its rocky continents, its rolling oceans and jagged valleys white under the enormous energy-flood from the gigantic star of Sirius, twenty-six times more brilliant than our own sun.

"That world is a world of young rivers. No river there has grown to a series of meanders, no river there has even flattened its valley! There are hundreds of gigantic waterfalls!" exclaimed Sel Felso Theu in surprise. "And yet there *are* rivers; there *is* rainfall! Certainly the planet can not be old with such a geological formation.

"It's old!" laughed Wade, "old as Earth. It is the planet Neptune, captured from our solar system by the Black Star as it passed a few years ago. The Negrians, as we called them, migrated here, and brought their old worlds to the new sun, and brought the new planet along. It had always been far from the sun, so far that water was continually locked up as ice, and the only rivers the planet knew were of liquid helium flowing to lakes of liquid helium, under an occasional snowstorm of hydrogen, or perhaps a little rain of the liquid hydrogen when the weather was unusually warm. It was cold out there. So cold that water never melted. The rivers of helium carved their way through mountains of ice and packed mountains of oxygen and nitrogen.

"When the planet came here, the Sirians, or the old Negrians, moved it very near to the sun, and set it spinning very rapidly. The enormous flood of heat melted even the vast ice fields, probably in a few months, warmed the great mass of the planet throughout. Then they moved it back from the fire where they had thoroughly toasted it, let it cool to a comfortable temperature, and finally placed it at this distance, as being the one most satisfactory for their purposes." Wade pointed to the city, which had suddenly leapt into view on the screen, as the ship, sinking close to the planet, swept over a mountain range. "There they are now—living on the new world.

"But Arcot, hadn't you better take it easy? They might take us for enemies—which wouldn't be so good."

"I suppose it would be wise to go slowly. I had planned, as a matter of fact, on looking up a Thessian ship, taking a chance on a fight, and proving our friendship," replied Arcot.

"My friend, would it not be wiser, and easier, to simply tell them we are friends?" asked Zezdon Afthen.

"Oh—certainly! I forgot that we could communicate with them mentally from a distance. You had best tend to it Zezdon Afthen."

"But," objected Morey, "I suspect that they won't be so sure we are friends when we come with a relux ship, equipped with cosmic projectors, rays, screens, and molecular rays, and they probably already suspect us of wishing to attack them—they probably already suspect that Earth has attacked them. They attacked us—we attacked them. Right? Then how convince them we are friends? Go attack a Thessian?"

Morey saw Arcot's logic—then suddenly burst into laughter. "Absolutely—attack a Thessian. But since we don't see any around now, we'll have to make one!"

MOREY was completely mystified, and gave Arcot a doubtful, sarcastic look. "Sounds like a good idea, only I wonder if this constant terrific mental strain—"

"Come along and find out!" Arcot threw the ship into artificial space for safety, holding it motionless. The planet, invisible to them, retreated from their motionless ship.

In the artificial matter control room, Arcot set to work, and developed a very considerable string of forms on his board, the equations of their formations requiring all the available formation controls. By the time he sat down to work, Morey just looked on; by the time he had set up the first, Morey aided him, and thereafter Wade was busy explaining to the Talsonian what Arcot intended.

"Now," said Arcot at last, "you stay here, Morey, and when I give the signal, create the thing back of the nearest range of hills, raise it, and send it toward us. Unfortunately we can't—oh yes we can." Some more work was done, a great deal more work, and it was fully half an hour before the new adjustments had been made. Then Arcot declared himself ready.

At once they returned to normal space, and darted down toward the now distant planet. They landed again near another city, one which was situated close to a range of mountains ideally suited to their purposes. They settled, while Zezdon Afthen sent out the message of friendship. He finally succeeded in getting some reaction, a sensation of scepticism, of distrust—but of interest. They needed friends, and only hoped that these were friends. Arcot pushed a little signal button, and Morey began his share of the play. From behind a low hill a slim, pointed form emerged, a beautifully streamlined ship, the lines obviously those of a Thessian, the windows streaming light, while the visible ionization about the hull proclaimed its molecular ray screen. Instantly Zezdon Afthen, who had carefully refrained from learning the full nature of their plans, felt the intense emotion of the discovery, called out to the others, while his thoughts were flashed to the Sirians below.

From the attacking ship, a body shot with tremendous speed, it flashed by, barely missing the *Ancient Mariner*, and buried itself in the hillside beyond. With a terrific explosion it burst, throwing the soil about in a tremendous crater. The *Ancient Mariner* spun about, turned toward the other ship, and let loose a tremendous bombardment of molecular and cosmic rays. A great flame of ionized air was the only result. A new ray reached out from the other ship, a fan-like spreading ray. It struck the *Ancient Mariner*, and did not harm it, though the hillside behind was suddenly withered and blackened, then smoking as the temperature rose.

Another projectile was launched from the attacking ship, and exploded terrifically but a few hundred feet from the *Ancient Mariner*. The terrestrial ship rocked and swayed, and even the distant attacker rocked under the explosion.

A projectile, glowing white, leaped from the earthship. It darted toward the enemy ship, seemed to barely touch it, then burst into terrific flames that spread, eating the whole ship, spreading glowing flame. In an instant the blazing ship slumped, started to fall, then seemingly evaporated, and before it touched the ground, was completely gone.

The relief in Zezdon Afthen's mind was genuine, and it was easily obvious to the Sirians that the winning ship was friendly, for, with all its frightful armament, it had downed a ship obviously of Thett, though not exactly like the others, it had the all too familiar lines.

"They welcome us now," said Zezdon Afthen's mental message to his companions.

"Tell them we'll be there—with bells on or thoughts to that effect," grinned Arcot. Morey had appeared in the doorway, smiling broadly.

"How was the show?" he asked.

"Terrible—Why didn't you let it fall, and break open?"

"What would happen to the wreckage as we moved?" he asked sarcastically. "I thought it was a darned good demonstration."

"It was convincing," laughed Arcot. "They want us now!"

The great ship circled down, landing gently just outside of the city. Almost at once one of the slim, long Sirian ships shot up from a courtyard of the city, racing out and toward the *Ancient Mariner*. Scarcely a moment later half a hundred other ships from all over the city were on the way. Sirians seemed quite humanly curious.

"We'll have to be careful here. We have to use altitude suits, as the Negrians breathe an atmosphere of hydrogen instead of oxygen," explained Arcot rapidly to the Ortolian and the Talsonian who were to accompany him. "We will all want to go, and so, although this suit will be decidedly uncomfortable for you and Zezdon Afthen and Stel Felso Theu, I think it wise that you all wear it. It will be much more convincing to the Sirians if we show that people of no less than three worlds are already interested in this alliance."

Stel Felso Theu, who had been looking at the headpiece, gigantic for his diminutive head, and the rest too small really for his heavy form, shrugged, and worked his way into the flopping, uncomfortable affair.

"Why any race," he commented good naturedly, "should develop their brains in such a poor, exposed place as the head, instead of the obviously more reasonable, better protected, better supported, and better nourished place like the hips, I don't know. You have told me, Wade, that many animals of your world did, in pre-human times, carry their brains in the more obvious place. Why did they move them to so poor a place as the head? The blood vessels must go through the easily accessible neck, the neck has to be straightened, the nerves all lead to a place distant from every part of the body, instead of centralizing near the center—and now look, I must needs rattle my eye-case (his thought-form for head) about in this great casket." His little face smiled cheerily, however, as he set the thin, strong, lux-metal helmet on his tremendous shoulders, and bolted it down.

"And such diminutive creatures—how can I be expected to wear so small a rag as this?" asked the huge Ortolian, pulling to stretch the elastic fabric about his great frame.

"The easiest way to get out of that, Zezdon Afthen, is to make one of your own," said Morey cheerfully bolting the headpiece on his shoulders. "Good luck!"

"Good luck!" added Wade softly as the three filed into the airlock of the ship. "For luck it must be."

A considerable number of Sirian ships had landed about them, and the tall, slim men of the 100,000,000-year-old race were watching them with their great brown eyes from a slight distance, for a cordon of men with evident authority were holding them back. Their flesh, once so exceedingly pale, lighted as their planets had been only by the stars, developed only to the slight immunity from destructive photo-active rays that such an existence needed, had darkened now, under the terrifically active rays of Sirius to a deep tan; they seemed a healthy, sturdy race now.

"Who are you, friends?" asked a single man who stood within the cordon. He was tall, his strongly built frame, great high brow and broad head designating him a leader at a glance.

Despite the vast change the light of Sirius had wrought, Arcot recognized in him the original of photographs he had seen from the planet old Sol had captured as Negra had swept past. So it was he who answered the thought-question. Though to the Sirian they had been words in his own tongue, to the terrestrian the thought-forms represented by his words had been clear English thought-forms.

"I am of the third planet of the green-blue sun your people sought as a home a few years back in time, Taj Lamor. Because you did not understand us, and because we did not understand you, we fought. We found the records of your old, old race on the planet our sun captured, and we know now what you most wanted. Had we been able to communicate with you then, as we can now, our people would never have fought.

"At last you have reached that sun you so needed, thanks, no doubt, to the genius that was with you.

"But now, in your new-found peace comes a new enemy, one who wants this sun, as you wanted ours, and wants not only yours, but every sun in this galaxy. Perhaps your people do not know all the plans these invaders have, but thanks to our allies, we have learned them, and we have learned of weapons with which we may fight them better than they can fight us.

"You have tried your ray of death, the anti-catalyst? And it but sputters harmlessly on their screens? You have been swept by their terrible rays that fuse mountains, then hurl them into space? Our world and the world of each of these men is similarly menaced. It is not a menace to you, but a menace to this galaxy, and all who live on its planets.

"See, here is Zezdon Afthen, a student of the laws of Nature from Ortol, planet of the star, Thil, far on the other side of the galaxy, and here is Stel Felso Theu, of the planet, Talso, of the Sun Renl. Their worlds, as well as yours and mine have been attacked by this menace from a distant galaxy, from Thett, of the sun Ansteck, of the galaxy Venone.

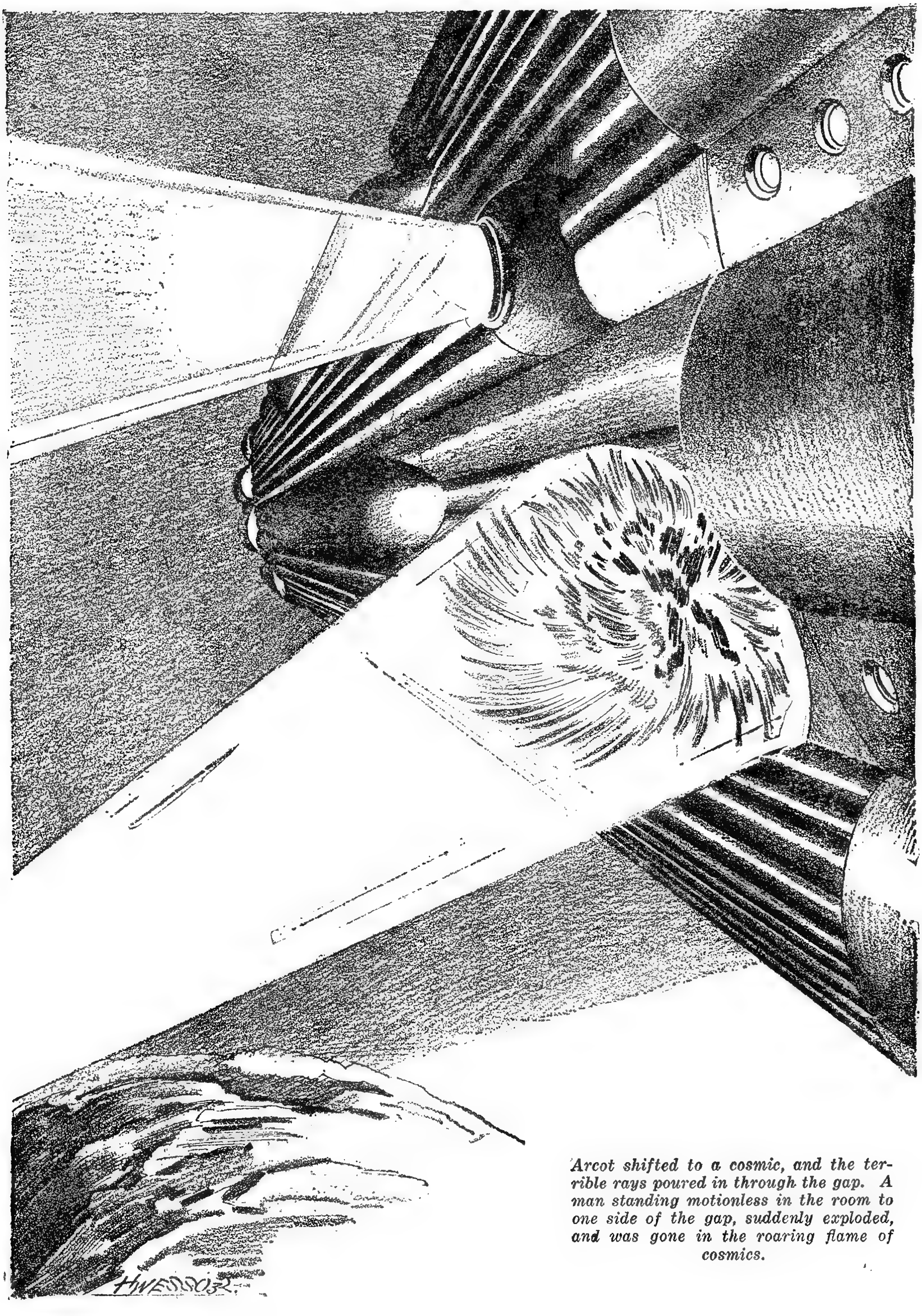
"Now we must form an alliance of far wider scope than ever has existed before.

"You have already discovered that this is a war of science. To you we have come, for your race is older by far than any race of our alliance. Your science has advanced far higher than any division of our present science. What weapons have you discovered among those ancient documents, Taj Lamor? We have one weapon that you no doubt need, perhaps. We have a screen, which will stop the rays of the molecule director apparatus. What have you to offer us?"

"We need your help, man of the blue-green star, we need it badly," was the reply. "We have been able to keep them from landing on our planets, but it has cost us much. They have landed on a planet we brought with us when we left the black star, but it is not inhabited. From this as a base they have made innumerable attacks on us. We tried throwing the planet into Sirius. They merely left the planet hurriedly as it fell toward the star, and broke free from our attractive ray."

"The attractive ray! Then you have uncovered that secret?" asked Arcot eagerly.

For long the men conferred, moving soon to the *Ancient Mariner*. Taj Lamor had some of his men bring a small attractive ray projector to the ship, and the "small" apparatus turned out to be nearly a thousand tons in weight, and some twenty feet long, ten feet wide and approximately twelve feet high. It was impossible to load the huge machine into the *Ancient Mariner*, so an examination was conducted on the spot, with instruments whose reading was intelligible to the Terrestrians operating it. Its principal fault lay in the fact that, de-



Arcot shifted to a cosmic, and the terrible rays poured in through the gap. A man standing motionless in the room to one side of the gap, suddenly exploded, and was gone in the roaring flame of cosmics.

spite the enormous energy of matter given out, the machine still gobbled up such titanic amounts of energy before the attraction could be established, that a very large machine was needed. In swinging the planets, the ray was established, and so long as maintained, used no more power than was actually expended in moving the planet or other body. The power used while the ray was in action corresponded to the work done, but a tremendous power was needed to establish it, and this power could never be recovered.

Further, no reaction was produced in the machine, no matter what body it was turned upon. In swinging a planet then, a space ship could be used as the base, for the reaction was not exerted on the machine.

From such meager clues, and the instruments, *plus* tests on the energy storage coils, Arcot got the hints that lead him to the solution of the problem, for the documents, from which Taj Lamor had gotten his information, had been disastrously wiped out, when one of their cities fell, and Taj Lamor had but copied the machines of his ancestors.

THE immense value of these machines was evident, for they would permit Arcot to do many things that would have been impossible without them. The explanation as he gave it to Stel Felso Theu, foretold the uses to which it might be put.

"As a weapon," he pointed out, "its most serious fault is that it takes a considerable time to pump in the power needed. It has here, practically the same fault which the artificial matter had on your world."

"As I see it, the ray is actually directed gravitational field. Undirected, the mass attraction of sextillions of tons of matter is needed to produce an attractive force of one Earth-gravity at a distance of four thousand miles from its center of mass.

"But if a spotlight-like ray is used instead—?"

"See; the mass of one proton is about 1.7×10^{-24} grams, its radius is approximately 2×10^{-16} centimeters. That makes the surface gravity of that minute speck comparable in magnitude to that of earth—three centimeters per second per second. Earth's is about nine hundred only.

"But here is the advantage. You could add a second and a third and a fourth proton, and add the surface gravity of each to that. So if you put in the sending end of such a beam a gram molecular weight of hydrogen, two grams of gas, with its 12×10^{23} protons, you would have a combined gravity 4×10^{21}—times earth's gravity! A pound mass in that beam would weigh two quadrillion tons.

"But actually their machine does not do just that. It consists of three parts really, three generating devices.

"The first consists of a gravitational field projector. They create the gravitational field of a few milligrams of matter, without the matter. The more concentrated this field, the more powerful their final beam will be. This is created as a field in space, remember, an integral, interwoven part in the titanic fabric of space, which is really but the interacting gravitational fields of all the matter in the Universe.

"Next they create a gravitational force-mirror. This requires enormous energy, as it is a peculiar space condition which requires the establishment of an inverted space curvature. This varies in size with the beam, and here is where the enormous amounts of energy are poured.

"The third, and final step, consists of the arrangement of these force-mirrors, by the action of a third set of devices. Then the gravitational field is built up by the machine, the minute attraction of this field is all directed in one path by the force mirrors, and because the exact surface attraction of that field is projected, the attractive power may be enormous, as I suggested in the case of protons.

"Now here is one thing that makes it more interesting, and more useful. It seems to defy the laws of mechanics. It acts, but there is no apparent reaction! A small ship can swing a world! Remember, the field that generates the attraction is an integral, interwoven part of the mesh of Space. It is created by something outside of itself. Like the artificial matter, it exists there, and there alone. There is reaction on that attractive field, but it is created in Space at that given point, and the reaction is taken by all Space. No wonder it won't move.

"The work considerations are fairly obvious. The field is built up. That takes energy. The beam is focussed on a body, the body falls nearer, and immediately absorbs the energy in acquiring a velocity. The machine replenishes the energy, because it is set to maintain a certain energy-level in the field. Therefore the machine must do the work of moving the ship, just as though it were a driving apparatus. After the beam has done what is wanted, it may be shut off, and the energy in the field is now available for any work needed. It may be drained back into power coils such as ours for instance, or one might just spend that last iota of power on the job.

"As a driving device it is delightful. No reaction, save on all Spave. Therefore a device in the nose of the ship might be set to pull the entire ship along, and still not have any acceleration detectable to the occupants.

"I think we'll use that on our big ship," he finished, his eyes far away on some future idea.

"Gravity, too, varies by the inverse square, quartering the force at twice the range. But if the gravitational attraction of one unit be completely projected on a straight line, so that we get, say the surface attraction of a proton—! Who knows its value? A proton's mass is close to 1.7×10^{-24} grams. Its radius is approximately 2×10^{-16}. That makes the surface gravity—Good Lord! It's close to the same order of magnitude of that of the Earth! It is, I think, about three cms per second per second. Earth is nine hundred. You'd have only one three-hundredth of your normal weight—if you could stand on one—but think of the infinitely minute size, and the tremendous numbers of such tiny masses obtainable. Then, if one unit has one three-hundredth, three hundred, rolled into one, would have Earth's surface gravity. Right? If we could put something up against that surface.

"But if a single mole, or gram-molecular-weight of a substance has 6×10^{-23} molecules, or, in hydrogen, 12×10^{-23} protons per two grams of gas, we would have 4×10^{-21} *times Earth's surface gravity if we could thus get the surface of each of those protons!**

"Natural gravity of natural matter is, luckily, not selective. It goes in all directions. But this artificial gravity is controlled so that it does not spread, and the result is that the mass-attraction of a mass of matter does not fall off as the inverse square of the distance, but like the ray from the parallel beam spotlight, continues undiminished. Thus the gravitational conditions existing at the surface of a proton exist, in a straight line, undiminished. Anywhere along the path of the ray, the conditions are those of the protons surface.

"Actually, they create an exceedingly intense, exceedingly small gravitational field, and direct it in a straight line. The building up of this field is what takes time.

But say, Morey," Arcot said suddenly turning to his friend, I wonder if there isn't a decided limit in the form of space-curving effects? Wouldn't space curve so badly as to close in the ray?"

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* $4 \times 10^{21} = 4{,}000{,}000{,}000{,}000{,}000{,}000{,}000$ times Earth's gravity. One pound weight on earth would be two quadrillion tons in this ray!

"Certainly!" laughed his friend, "But what's the value of the force-field that does that?"

"Hmmm—so darned high you couldn't make anything stand up in it."

"Precisely.

"That ray has two excellent possibilities as a weapon. It can be used in a slightly diffused form, as they use it, to move bodies, or, if it can be concentrated indefinitely, it would simply draw everything together in so tiny a partical—it would simply bore a neat, round hole through anything."

"Including the apparatus that generated it," added Wade.

"Then it can't be intensified indefinitely, because the apparatus that does the work would be destroyed by the space strains around that field. Remember, to make it directional, they have to change those space strains, and send them off at an angle." Arcot was thinking aloud.

All the men were silent for some time, and Zezdon Afthen, who had a question which was troubling him, looked anxiously at his friends. Finally he broke into their thoughts which had been too cryptically abbreviated for him to follow, like the work of a professor solving some problem, his steps taken so swiftly and so abbreviated that their following was impossible to his students.

"But how is it that the machine is not moved when exerting such force on some other body?" he asked at last.

"Oh, the ray concentrates the gravitational force, and projects it. The actual strain is in space. It is space that takes the strain, but in normal cases, unless the masses are very large, no considerable acceleration is produced over any great distance. That law operates in the case of the pulled body; it pulls the gravitational field as a normal field, the inverse-square law applying.

"But on the other hand, the gravity-beam pulls with a constant force.

"It might be likened to the light-pressure effects of a spotlight and a star. The spotlight would push the sun with a force that was constant, no matter what the distance, while the light pressure of the sun would vary as the inverse square of the distance.

"But remember, it is not a body that pulls another body, but a gravitational field that pulls another. The field is in space. A normal field is necessarily attached to the matter that it represents, or that represents it as you prefer, but this artificial field has no connection in the form of matter. It is a product of a machine, and exists only as a strain in space. To move it you must move all space, since it, like artificial matter, exists only where it is created in space.

"Do you see now why the law of action and reaction is apparently flouted? Actually the reaction is taken up by space."

Arcot rose, and stretched. Morey and Wade had been looking at him, and now they asked when he intended leaving for the intergalactic spaces.

"Now, I think. We have a lot of work to do. At present we have the mathematics of the artificial matter to carry on, and the math of the artificial gravity to develop. We gave the Sirians all we had on artificial matter and on moleculars.

"They gave us all they had—which wasn't much beyond the artificial gravity, and a lot of work. At any rate, let's go!"

Once more the *Ancient Mariner* was to do her warlike work against the Glossians.

CHAPTER XIII

Attacked

THE *Ancient Mariner* stirred, and rose lightly from its place beside the city. Up, up, up it climbed, in horizontal position. A number of small Sirian ships kept it company as it started out into space.

Suddenly they seemed to stop, and at a common signal they dropped frantically toward the ground below, and toward the city. The city was suddenly showing a liveliness and activity that had not been displayed before. Arcot became suspicious, and snapped on the loud-speaker, giving sound access to the ship. Instantly the whine of a siren-like apparatus became evident. Arcot "jumped" the ship several miles in a dive upwards under high acceleration. Then he looked about. Visible over the horizon now, and coming at terrific speed, were a fleet of seven Thessian ships.

They must do their best to protect that city. Arcot turned the ship and called his decision to Morey. As he did so, one of the Thessian ships suddenly swerved violently, and plunged downward. The attractive ray was in action. It struck the rocks of Neptune, and plunged in. Half buried, it stopped. Stopped—and backed out! The tremendously strong relux and lux had withstood the blow, and these strange, inhumanly powerful men had not been injured! Of course the sharp turn had not bothered them, had not been felt, inasmuch as everything on the ship was affected equally, which caused the turn.

But the ships were coming still. More slowly—but steadily.

"They suffered thirty-three casualties in the crash, due to falling objects," thought Afthen to his friends.

"Which explains their caution," replied Arcot.

Two of the ships darted toward him simultaneously, flashing out molecular rays. The rays glanced off of Arcot's screen already in place, but the tubes were showing almost at once that this could not be sustained. It was evident that the swiftly approaching ships would soon break down the shields. Arcot turned the ship and drove to one side as a cosmic reached out. His eyes went dead.

He cut into artificial space, waited ten seconds, then cut back. The Thessians were searching for him. Suddenly he gasped. The scene before him changed. It seemed a different world. The light was very dim, so dim he could scarcely see the images on the view plate. They were red, so exceeding deep a red that they were very near to black. Even Sirius, the flaming blue-white star was red, as deep a red as the objects about. The darting Thessian ships were moving quite slowly now, moving at a speed that was easy to follow. Their cosmics, before ionizing the air brilliantly red, were now dark. The instruments showed that the screen was no longer encountering serious loading, and, further, the load was coming in at a frequency harmlessly far down the radio-spectrum!

Arcot stared in wide-eyed amazement. What could the Thessians have done that caused this change? He reached up and increased the amplification on the eyes to a point that made even the dim illumination sufficient. Wade was staring in amazement, too.

"Lord! What an idea!" suddenly exclaimed Arcot. "Morey," he called exultantly, "The fools haven't thought of it. Increase it gradually. The trouble now is we get too high in the blue but we have amplification that should let us use the X-ray, and Sirius should be more generous!"

Wade was staring at Arcot in equally great amazement. "What's the secret?" he asked.

"Think, Wade, think!" replied Arcot joyously, and went to work. He moved the *Ancient Mariner* up to the nearest Thessian ship, and as he did so the scene changed again. It became even gloomier, but what faint light there was changed now, and there was a curious violet shading to it. The sun had a strange red-blue cast. Arcot increased the amplification of the kino-view lamps. The scene shifted once more, and now it was lighted with a ghastly blue tint. The Thessian ships were motionless, blue-glinting ghost ships. They hung silently, motionless where they were.

The *Ancient Mariner* was very close now. Arcot turned a molecular ray toward the ship, and the air immediately about the ship blazed in the characteristic reddish ionization of the Sirian atmosphere. But, ten feet from the ship, the ionization disappeared. The ray seemed stopped. But the Thessian ship became suddenly luminous in a large spot, with the characteristic shifting colors of disintegrating relux. In a short time, a time far shorter than was ordinarily required to disintegrate a thickness of more than two inches, the six-foot wall was changed, and lux remained. Arcot shifted to a cosmic, and the terrible rays poured in through the gap. A man standing motionless in the room to one side of the gap suddenly exploded, and was gone in the roaring flame of cosmics. In an instant the entire inside of the ship was a blazing inferno of cosmic rays, reflected, re-reflected and again re-re-flected about the relux walls, drenching every atom of matter within under the destructive rays.

The ship was blazing, the atomic fires of disintegrating atoms spreading in the very air. It was unthinkable that anything could live in that section of the ship. But other sections—.

Arcot's molecular rays were going. There was a peculiar flash for a moment as the rays tore at the relux of the ship, stripping it to lux metal. The rays entered in a moment, and an instant later the cosmics were drenching that section of the ship also.

ARCOT had been paying very little attention to the other Thessian ships, blue ghosts in the air, motionless things. Suddenly he started, and drove his ship aside. One of the motionless ghosts had come to life!

"Morey—they've got it—artificial matter," called Arcot sharply. A wall of artificial matter, a disc that was precisely flat loomed before the Thessian ship. It struck it with terrific force. The ship crumpled and bent in on itself like a food can under a sledge hammer. The artificial matter disc became a cylinder, whose base was the disc. It formed another end, and the Thessian ship was closed in. The cylinder closed, shrank, till it was a very small thing. Then it released a small cylinder of something that floated gently, very gently, downward.

"Try that on the other ships. Their screens won't stop the stuff now!" called Arcot.

Morey tried it. But that was all. The artificial matter seemed to move through the ships without affecting them.

"Wrong idea, Arcot. They won't touch us, we can't touch them, much less artificial matter. It gets there at the wrong time."

"The rays work," replied Arcot.

"Because they shift when they reach the border."

"What's the secret, Arcot? I give up!" said Wade desperately.

"Time, man, time! We are in an advanced time plane, living faster than they, our atoms of fuel are destroyed faster, our second is shorter. In one second of our earthly time our generators do the same amount of work as usual, but they do many, many times more work in one second of the time we were in! We are under the advanced time field."

Quickly now Wade could see it all. The red light—normal light seen through eyes enormously speeded in all perceptions, the change, the dimness—dim because less energy reached them per second of their time. Then came this blue light, as they reached the X-ray spectrum of Sirius, and saw X-rays as normal light—shielded, tremendously shielded by the atmosphere, but the enormous amplification of the eyes made up for it.

The ship that had been rayed had no doubt seen only a flash of molecular rays, a terrific flood of cosmics coming at a rate that bespoke a generator of unheard of proportions, apparently. The relux, flooded with an enormous energy of molecular ray frequency, broke down swiftly. Morey had re-tuned the rays for the time-rate to make them effective, but the artificial matter operated on a different time-rate plane. It was matter, not light.

Arcot found that only the rays were effective, and these were exceedingly hard to control, for the effective of the time-field and gravitational field of the planet twisted them badly. The artificial matter would be effective if an enemy ship attempted to attack on their time-plane, but not otherwise.

Despite the difficulties, three more ships were rayed down before the remaining Thessians seemed to attain the idea simultaneously, and started for Arcot in his own time field. Already at close to the maximum speed safe near the planet, Arcot was forced to fight them in on their time frame now. Artificial matter got one ship as it entered the new frame, and the remaining ship was in his time frame. His molecular equipment seemed of the best, and he was bent on putting it all into operation at once, as well as ramming the terrestrial ship. Arcot's tubes heated swiftly, and though he tried the magnet, it failed. His own screen prevented the use of the artificial matter now, while the weakening screen was fatal. The Thessian ship seemed leaping at him. Suddenly, his speed increased inconceivably. Simultaneously, Arcot's hand, already started toward the space-control switch, reached it, and pushed it to the point that threw the ship into artificial space. The last glimmer of light died suddenly, as the Thessian ship's bow loomed huge beside the *Ancient Mariner*.

There was a terrific shock that hurled the ship violently to one side, threw the men about inside the ship, and a crash of pans, metal plates, loose articles of all sorts, supposedly tied down, rang through the ship.

Simultaneously the lights blinked out, the air whished from the room, and the expansion cooled the remaining atmosphere uncomfortably before a special locking gate closed the door of every room, as the air pressure fell below normal in it.

Light returned as the automatic emergency incandescent lights in the room, fed from an energy storage coil, flashed on abruptly. The men were white-faced, tense in their positions. Swiftly Morey was looking over the indicators on his remote-reading panel, while Arcot stared at the few dials before the actual control board.

"Power room flooded with cosmics. Gone," snapped Morey. Arcot had opened the power switch. "From the generator. The power coils are still functioning, we're in artificial space. *There's an air pressure outside the ship!*" he cried out in surprise. "High oxygen, very little nitrogen, breathable apparently, provided there are no poisons. Temperature ten below zero C.

"Lights are off because relays opened when the crash short-circuited them." Morey and the entire group were suddenly shaking. They could scarcely hold themselves still, as their muscles jumped and quivered so.

"Nervous shock," commented Zezdon Afthen, his thoughts strangely distorted; shaky one might say. "It will be an hour or more before we will be in condition to work."

"Can't wait," replied Arcot testily, his nerves on edge, too. "When the ship was struck, curiously, I was calm enough, and didn't even think about what might happen to us; my only thoughts were what was happening to my pet ship. Morey, get some good strong coffee if you can, and we'll waste a little air on some smokes."

Morey rose and went to the door that lead through the main passage to the galley. "Heck of a job—no weight at all," he muttered. "There is air in the passage, anyway." He opened the door, and the air rushed from the control room to the passage till the pressure was equalized. The door to the power room was shut, but it was bulged, despite its two-inch lux metal, and through its clear material he could see the wreckage of the power room. "Arcot," he called, "Come here and look at the power room. Quintillions of miles from home, and probably infinitely distant, for we can't shut off this field now." Arcot was with him in a moment. The tremendous mass of the nose of the Thessian ship had caught them full amidship, and the powerful ram had driven through the room. It had, by a miracle, missed the molecular tubes, so that they had continued to function until Arcot shut them off. Their lux walls had not been touched, and only a sledge-hammer blow would have bent them under any circumstances, let alone breaking them. But the tremendously powerful main generator was split wide open. Through a great rent in its side the cosmics had poured out into the room, and though all vital machinery had been shielded in relux, some of the lesser apparatus around the room had been burned. But the mechanical damage was the main item. The prow of the ship had been driven deep into the machine, and the power room was a wreck. Half of the tremendous leads were cut, and the huge power leads that carried the power to and from the auxiliary storage coils were cut. The main coil was charged, and would stay charged till they drained it.

"And," pointed out Morey," we can't handle a job like that. It will take a tremendous amount of machinery back on a planet to work that stuff, and we couldn't bend that bar, let alone fix it. We'd have to put both ends together, then run new relux into a mold, and let it knit under the K-4Z field. We can't make a K-4Z field without apparatus, and we haven't the apparatus, nor the wherewithal to make the darned stuff."

"Get the coffee, will you please, Morey? I have an idea that's bound to work," said Arcot looking fixedly at the machinery.

Morey turned and went to the galley. In a few minutes he reported that the electric stove was useless, but that he was trying to work it on his pocket cosmic ray projector. He took out the power storage coil, and with some difficulty made a contact between the metal wires of the stove and the relux leads of the storage coil. The more than a million watt-hours stored in the tiny coil, no larger than his fist, solved the problem. In a short time the coffee, which had simply spread itself about the walls of the closed pot, was hot. The pressure was mounting rapidly, and Morey turned off the current. A small petcock opened in the side, and the coffee spouted out in a stream under the pressure of the water. It promptly rebounded from the bottom of the cup, and shot all around the room. Morey cursed and dropped the cup. It shot away under the impetus of the stream of coffee. Morey shut off the coffee, and cursed some more, nervously. Wade appeared, and took in the scene at a glance.

FIVE minutes later they returned to the corridor, where Arcot stood still, looking fixedly at the engine room. They were carrying small rubber balloons with coffee in them.

They drank the coffee and returned to the control room, and sat about, the terrestrians smoking peacefully, the Ortolian and the Talsonian satisfying themselves with some form of mild narcotic from Ortol, which Zezdon Afthen introduced.

"Ah—. Arcot, I never knew what a smoke was for, till now," said Wade gratefully as he puffed out a blue-grey streamer of the fine, fragrant Venerian-grown tobacco smoke.

"Well, we have a lot more to do. The air-apparatus stopped working a while back, and I don't want to sit around doing nothing while the air in the storage tanks is used up. Did you notice our friends, the enemy?" Through the great pilot's window the bulk of the Thessian ship's bow could be seen. It was cut across with an exactitude of mathematical certainty. The surfaces were so absolutely true that they shone with definite, sharp images.

"Easy to guess what happened," Morey grinned. "They may have wrecked us, but we sure wrecked them. They got half in and half out of our space field. Result—the half that was in, stayed in. The half that was out stayed out. The two halves were instantaneously a billion miles apart, and that beautifully exact surface represents the point our space cut across. They apparently passed out with a bang, the air left them—er—not flat exactly, from what I have seen elsewhere. I suspect that they can't use their space suits in the ship when in battle because they are so heavy and clumsy that delicate, quick work can't be done in them. In an actual battleship I suspect they carry only the necessary working crew. That accounts for the air pressure outside. But it certainly must be tremendous to fill the space of this artificial space of ours so full!

"That being decided, the next question is how to fix this poor old wreck?" Morey grinned a bit, "Better, how to get out of here, and down to old Neptune?"

"Fix it!" replied Arcot. "Come on; you get in your space suit, take the portable telectroscope and set it up in space, motionless, in such a position that it views both our ship, and the nose of the Thessian machine, will you Wade? Tune it to—seven-seven-three." Morey rose with Arcot, and followed him, somewhat mystified, down the passage. At the air-lock Wade put on his space suit, and the Ortolian helped him with it. In a moment the other three men appeared bearing the machine. It was naturally practically weightless, though it would fall slowly if left to itself, for the mass of the *Ancient Mariner* and the front end of the Thessian ship made a considerable attractive field. But it was clumsy, and needed guiding here in the ship.

Wade took it into the air-lock, and a moment later into space with him. His hand molecular-driving unit pulling him, he towed the machine into place, and with some difficulty got it practically motionless with respect to the two bodies, which were now lying against each other.

"Turn it a bit, Wade, so that the *Ancient Mariner* is just in its range," came Arcot's thoughts. Wade did so. "Come on back and watch the fun."

Wade returned. Arcot and the others were busy placing a heavy emergency lead from the storeroom in the place of one of the broken leads. In five minutes they had it fixed where they wanted it.

"But," objected Wade, "that's just a laboratory lead. How come?" The Talsonian looked at it thoughtfully a moment, then suddenly his face brightened.

"I think," he commented thoughtfully, "that Arcot has a very, very strong hand."

"He has—now," grinned Morey. "Just watch dumbbell."

Into the control room went Arcot, and started the power-room teleview plate. Connected into the system of viewplates, the scene was visible now on all the plates in the ship. Well off to one side of the room, prepared for such emergencies, and equipped with individual power storage coils that would run it for several days, the viewplate functioned smoothly.

"Now, we are ready," said Arcot. The Talsonian proved he understood Arcot's intentions by preceding him to the laboratory.

Arcot had two viewplates operating here. One was covering the scene as shown by the machine outside, and the other showed the power room.

"Oh," muttered Wade sheepishly. Arcot stepped over to the artificial-matter machine, and worked swiftly on it. In a moment the power from the storage coils of the ship was flowing through the new cable, and into the machine. A huge ring appeared about the nose of the Thessian ship, fitting snugly over it. A terrific wrench—and it was free of the *Ancient Mariner.* The ring contracted, but through the relux, and formed a chunk of the stuff free of the broken nose of the ship.

It was carried over to the wall of the *Ancient Mariner,* a smaller piece snipped off as before, and carried inside. A piece of perhaps half a ton mass. "I hope they use good stuff," grinned Arcot. The piece was deposited on the floor of the ship, and a disc formed of artificial matter plugged the hole in its side. Another took a piece of the relux from the broken Thessian ship, and pushed it into the hole on the ship. Suddenly the meters of the artificial-matter machine ran up enormously. The space about the scene of operation was a crackling inferno of energy breaking down into heat and light. Arcot dematerialized his tremendous tools, and the wall of the *Ancient Mariner* was neatly patched with relux, smoothed over as perfectly as before. A second time, using some of the relux he had brought within the ship, and the inner wall was rebuilt. The job was absolutely perfect, save that now, where there had been lux, there was an outer wall of relux.

The main generator was crumpled up, and torn out. The auxiliary generators would have to carry the load. The great cables were swiftly repaired in the same manner, a perfect cylinder forming about them, and a piece of relux from the store Arcot had sliced from the enemy ship, welding them perfectly under enormous pressure, pressure that made them flow perfectly into one another as heat alone could not.

In less than half an hour the ship was patched up, the power room generally repaired, save for a few minor things that had to be replaced from the stores. The main generator was gone, but that was not an essential. The door was straightend and the job done. In an hour they were ready to proceed.

CHAPTER XIV

Intergalactic Space

"WELL, Sirius has retreated a bit," observed Arcot. The star was indeed several trillions of miles away. Evidently they had not been motionless as they had thought, but the interference of the Thessian ship had thrown their machine off.

This was not the true explanation, as they later learned to their sorrow, but it was the one that occurred to their minds as the most natural. Their apparatus, designed for rapid travel, had hurled them through space. That seemed natural. But the true explanation —how could they have guessed it?

"Shall we go back, or go on?" asked Morey.

"The ship works. Why return?" asked Wade. "I vote we go on."

"And so say I," added Arcot.

"If they who know most of the ship vote for a continuance of the journey, then assuredly we who know so little can only abide by their judgment. Let us continue," said Zezdon Afthen gravely.

"She behaves QAR, Arcot?" asked Morey.

"Perfectly."

"Then let's go on. We have no reason to return to Sirius."

Space was suddenly black about them. Sirius was gone, all the jewels of the heavens were gone in the black of swift flight. Ten seconds later Arcot lowered the space-control. Black behind them the night of space was pricked by points of light, the infinite multitude of the stars. Before them lay—nothing. The utter emptiness of space between the galaxies.

"Thlek Styrs! What happened?" asked Morey in amazement, his pet Venerian phrase rolling out in his astonishment.

"Tried an experiment, and it was overly successful," replied Arcot, a worried look on his face. "I tried combining the Thessian high speed time distortion with our high speed space distortion—both on low power. 'There ain't no sich animals,' as the old agriculturist remarked of the giraffe. God knows what speed we hit, but it was plenty. We must be ten thousand light years beyond the galaxy."

"That's a fine way to start the trip. You have the old star maps to get back by, however, have you not?" asked Wade.

"Yes, the maps we made on our first trip out this way are in the cabinet. Look 'em up, will you, and see how far we have to go out before we reach the cosmic fields?"

Arcot was busy with his instruments, making a more accurate determination of their distance from the "edge" of the galaxy. He adopted the figure of twelve thousand five hundred light years as the probable best result. Wade was back in a moment with the information that the fields lay about sixteen thousand light years out. Arcot went on, at a rate that would reach the fields in two hours. In the meantime the Terrestrians took a nap, while the tireless Talsonian watched the ship.

At the end of an hour and fifty minutes Arcot was violently awakened by striking the side of his room. The relux window screens were up, and he could not see out, but he knew what was happening. He drove for the controls, reached them without being thrown against the wall but four times, and shut off the space control. The ship continued to lurch, but not as badly. On the time control, which he applied for an instant, the ship lurched even more violently. The molecular control backed them out in less than an hour, to a point where the pitching was slight. In the meantime both the Ortolian and the Talsonians were made most desperately sick by the motion. Then Morey, Arcot and Wade set to work with the Talsonian scientist on their instruments. For several hours they worked steadily. They retreated further, and took more readings. Then, throwing the combined time and space control on full power for an instant, they drove forward. They were again moving smoothly, after a single violent jerk, but the galaxy was so far behind, it was a point.

"It works—but it works too well. We'll have to go back—by careful maneuvering," said Arcot drily. "The double drive was not a thing to use for going home evenings. Unless your home was somewhere in the next galaxy."

"It seems, Arcot, that we could reach Andromeda M

31 at 1,000,000 light years more quickly than we could reach England at 3000 miles," laughed Wade.

"Laugh now—but tell me how to get back there in less than an hour," commented Arcot looking at the rear viewplate.

NEVERTHELESS he swung the ship about, reversed the actual motion, and started it back on the molecular drive, and threw it into the space-drive, with a touch of the time-drive. A minute later he took the two off. They were 50,000 light years from the galaxy. Proceeding slowly now, he soon ran into the invisible cosmic field at 43,000 light years.

Here, several hours more were spent in measurements, till at last Arcot announced himself satisfied.

"Good enough—back we go." Again in the control room, he threw on the drive, and shot through the twenty-seven thousand light years of cosmic ray fields, and then more leisurely returned to the galaxy. The star maps were strangely off. They could follow them, but only with difficulty as the general configuration of the constellations that were their guides were visibly altered to the naked eye.

"Morey," said Arcot softly, looking at the constellation at which they were then aiming, and at the map before him, "there is something very, very rotten. I won't say it's in the State of Denmark; that doesn't exist any more, and, anyhow, it's too far off. But the Universe either 'ain't what it used to be' or we have traveled in more than space."

"I know it, and I agree with you. Obviously, from the degree of alteration of the constellations, we are off by about 100,000 years. Question: which way, early or late? Question: how come? Question: what are we going to do about it?"

"Answer one: we can determine by determining the direction of relative motion of those stars, but not necessarily their magnitudes. Or, we can return to Earth and determine there.

"Answer two: remembering what we observed *in re* Sirius, I suspect that the interference of that Thessian ship, with its time-field opposing our space-field did things to our time-frame. We were probably thrown off then.

"As to the third question, we have to determine number one first. Then we can plan our actions."

With Wade's help, and by coming to rest near several of the stars, then observing their actual motions, they were actually able to determine their time-status. The estimate they made finally was of the order of eighty thousand years in the past! The Thessian ship had thrown them eighty thousand years out of their time.

"This isn't all to the bad," said Morey with a sigh," We at least have all the time we could possibly use to determine the things we want for this fight. We might even do a lot of exploring for the archeologists of Earth and Venus and Ortol and Talso. As to getting back—that's a question."

"Which is," added Arcot, "easy to answer now, thank the good Lord. All we have to do is wait for our time to catch up with us. If we just wait eighty thousand years, eight hundred centuries, we will be in our own time."

"Oh, I think waiting so long would be boring," said Wade sarcastically. "What do you suggest we do in the intervening eighty millenniums? Play cards?"

"Oh, cards or chess. Something like that," grinned Arcot. "Play cards, calculate our fields—and turn on the time rate control."

"Oh—I take it back. You win! Take all! I forgot all about that," Wade smiled at his friend. "That will save a little waiting, won't it."

"The exploring of our worlds would without doubt be of infinite benefit to science, but I wonder if it would not be of more direct benefit if we were to get back to our own time, alive and well. Accidents always happen, and for all our weapons, we might easily meet some animal which would put an abrupt and tragic finish to our explorations. Is it not so?" asked Stel Felso Theu.

"I knew nothing of the animals of your world, and little at the actual time, of the life of my world, but in the past, before History was invented, there were animals on my world which would probably have required more killing than one could readily give them," added Zezdon Fentes.

"Your point is good, Stel Felso Theu. I agree with you. We will do no more exploring than is necessary, or safe."

"We might just as well travel slowly on the time retarder, and work on the way, save that in that case someone has to keep an eye on the screens. I think the thing to do is to go back to Earth, or better, the solar system, and follow the sun in its path."

"Follow the sun in its lonely, awesome journey through the eighty thousand years that we have been hurled through time, follow it through a single, instantaneous flash of its eon-long journey through infinite time and infinite space," added Morey softly. "Through the utter desolation of absolute cold that forever saps its energy."

They returned, and the desolation that the sun in its journey passes through is nothing to the utter, oppressive desolation of empty space between the stars, for it has its family of planets—and it has no conscious thought.

The Sun was far from the point that it had occupied when the travelers had left it, billions on billions of miles, for every hour sees it close to forty thousand miles further on its journey around the gravitational center of our galactic universe, and in the eighty millenniums that they must wait, it would go far.

They did not go to the planets now, for, as Arcot said in reply to Stel Felso Theu's suggestion that they determine more accurately their position in time, life had not yet developed to an extent that would enable them to determine the year according to our calendar.

So for thirty thousand years they hung motionless as the sun moved on, and the little spots of light, that were worlds, hurled about it in a mad race. Even Pluto, in its three-hundred-year-long track seemed madly gyrating beneath them; Mercury was a line of light, as it swirled about the swiftly moving sun.

But that thirty thousand years was thirty days to the men of the ship. Their time rate immensely retarded, they worked on their calculations. At the end of that month Arcot had, with the help of Morey and Wade, worked out the last of the formulas of artificial matter, and the machines had turned out the last graphical function of the last branch of research that they could discover. It was a time of labor for them, and they worked almost constantly, stopping occasionally for a game of some sort to relax the nervous tension.

AT the end of that month they decided that they would go to Earth, not hoping to find life, but hoping to find relaxation.

They speeded their time rate now, and flashed toward Earth at enormous speed that brought them within the atmosphere in minutes. They had landed in the valley of the Nile. Arcot had suggested this as a means of determining the advancement of life of man. Man had evidently established some of his earliest civilizations in this valley where water and sun for his food plants were assured.

"Look—there *are* men here!" exclaimed Wade. Indeed, below them were villages, of crude huts made of timber and stone and mud. Rubblework walls, for they needed little shelter here, and the people were but savages at this time, fifty thousand years before our histories.

"Shall we land?" asked Arcot, his voice a bit unsteady with suppressed excitement.

"Of course!" replied Morey, without turning from his station at the window. Below them now, less than half a mile down on the patchwork of the Nile valley, men were standing, staring up, collecting in little groups, gesticulating toward the strange thing that had materialized in the air above them, a great, shining thing, a thing for which there were no words in their language and no thoughts in their minds. A thing unheard of.

"Does every one agree that we land?" asked Arcot.

There were no dissenting voices, and the ship sank gently toward a road below and to the left. A little knot of watchers broke, and they fled in terror as the great machine approached, crying out to their friends, casting affrighted glances at the huge, shining monster behind them.

Without a jar the mighty weight of the ship touched the soil of its native planet, touched it fifty millenniums before it was made, five hundred centuries before it left!

"There is one thing puzzles me—I can't see how we can come back. Don't you see, Morey, we have disturbed the lives of those people, we have affected history. Either this was ordained—it must be that, in our right time the effect of this call was ordained, had already been felt. This must be written into the history that exists.

"This call seems to banish the idea of free thought. Think, if we were not intended, forced, to come here, we would have changed history, yet history is that which is already done!

"Had I never been born, had—but I *was* already—I existed fifty-eighty thousand years before I was born!" exclaimed Arcot.

"Let's go out and think about that later. We'll go to a psychopathic hospital, if we don't stop thinking about problems of space and time for a little while. We need some kind of relaxation."

"I suggest that we take our weapons with us. These men may have weapons of chemical nature, such as poisons injected into the flesh on small sticks hurled either by a spring device or by pneumatic pressure of the lungs," said Stel Felso Theu as he rose from his seat, unstrapping himself.

"Arrows and blow-guns we call 'em. But it's a good idea, Stel Felso, and I think we will," replied Arcot. "Let's not all go out at once, and the first group to go out goes out on foot, so they won't be scared off by our flying around."

Arcot, Wade, Zezdon, Afthen, and Stel Felso Theu went out. The natives had retreated to a respectful distance, and were now standing about, looking on, chattering to themselves. They were edging nearer.

"Growing bold," grinned Wade.

"It is the characteristic of intelligent races manifesting itself—curiosity," pointed out Stel Felso Theu.

"Are these the type of men still living in this valley, or who will be living there in fifty thousand years?" asked Zezdon Afthen.

"I'd say they weren't Egyptians as we know them, but typical Neolithic men. See, their clothing consists of rough hides, stinking hides I might say. How do they stand it? Yet they are intelligent looking. It seems they have brains fully as large as some of the men I see on the streets of New York. I wonder if they have the ability to learn as much as the average man of—say about 1950? That was just shortly before men began to grow tall.

"You know, Zezdon Afthen, I am not unusually tall, nor is Morey unusually tall for our race, yet we are both well over six feet. Morey is nearly six and one-half feet tall. In 1950, less than two hundred years ago, a man of that height would have loomed over the crowd enormously. A man of six feet even, would have stood out in the crowd. A man of six feet then would have been able to look over the heads of most of the people in a crowd about him, for the average height of the men of New York City was of the order of five feet six. Now Morey with his six-six is not outstanding. And remember that a large man has a large head, of necessity." Arcot was warming up on one of his pet topics, but the Neolithic men were also warming up. There was an orator among them, and his grunts, growls, snorts and gestures were evidently affecting them. They had sent the women back (by the simple and direct process of sweeping them up in one arm and heaving them in the general direction of home). The men were brandishing polished stone knives and axes, various instruments of war and peace. One favorite seemed to be a large club.

"Let's forestall trouble," suggested Arcot. He drew his cosmic ray pistol, and turned it on the ground directly in front of them, and about half way between them and the Neoliths. A streak of the soil about two feet wide flashed into intense radiation under the impact of millions on millions of horsepower of radiant energy. Further, it was fused to a depth of twenty feet or more, and intensely hot still deeper. The Neoliths took a single look at it, then turned, and raced for home.

"Didn't like our looks. Let's go back."

They wandered about the world, investigating various peoples, and proved to their own satisfaction that there was no Atlantis, not at this time at any rate. But they were interested in seeing that the polar caps extended much further toward the equator; they had not retreated at that time to the extent that they had by the opening of history.

They secured some fresh game, an innovation in their larder, and a welcome one. Then the entire ship was swept out with fresh, clean air, their water tanks were filled with water from the cold streams of the melting glaciers. The air apparatus was given a new stock to work over. The principle of this apparatus was the principle of nature's apparatus on Earth. The carbon dioxide was absorbed in water as the air was forced through under great pressure. Collected thus, it was also an effective system for washing the air free of dust and impurities.

The carbon dioxide was now collected and electrolyzed in a solution prepared for this purpose. The oxygen was freed, the carbon collected. Some water must be electrolyzed also, but the greater part of the oxygen replacement came from the oxygen tanks, where the gas was stored under such enormous pressure that it was denser than aluminum. Aluminum tended to float in the air!

Their supplies in a large measure restored, thousands of aerial photographic maps made, they returned once more to space to wait.

Their time was taken up for the most part by actual work on the enormous mass of calculation necessary. It is inconceivable to the layman what tremendous labor is involved in the development of a single new theory, and a concrete illustration of it was the long time, with tremendously advanced calculating machines, that was required in their present work.

THEY had worked out the problem of the time-field, but there they had been aided by the actual apparatus, and the possibilities of making direct tests on machines already set up. The problem of artificial matter, at length fully solved, was a different matter. This had required within a few days of a month (by their clocks; close to thirty thousand years of Earth's time), for they had really been forced to develop it all from the beginning. In the small improvements Arcot had instituted in Stel Felso Theu's device, he had really merely followed the particular branch that Stel Felso Theu had stumbled upon. Hence it was impossible to determine with any great variety, the type of matter created. Now, however, Arcot could make any known kind of matter, and many unknown kinds.

But now came the greatest problem of all. They were ready to start work on the data they had collected in space.

"What," asked Zezdon Afthen, as he watched the three terrestrians begin their work, "is the nature of the thing you are attempting to harness?"

"In a word, energy," replied Arcot, pausing.

"We are attempting to harness energy in its primeval form, in the form of a space-field. Remember, mass is a measure of energy. Two centuries ago a scientist of our world proposed the idea that energy could be measured by mass, and proceeded to prove that the relationship was the now firmly intrenched formula $E = Mc^2$. Energy of any mass equals the product of that mass times the velocity of light squared, all units in the same measurement system. That applies whether we use the terrestrial system of centimeter-gram-second, your system of steh-rensl-kwuns or Stel Felso's system of thels-meles-gerds. It is true, and the reason is that all energy is represented, or better is a field in space. All energy has mass, all energy has a field in space. If it be the energy of matter, it is represented by the gravitational field; if it be chemical energy—the reacting substances do weigh a minute amount more before than after the reaction in the case of an exothermic reaction.

"The sun is giving off energy. It is giving off mass, then, in the form of light photons. The field of the sun's gravity must be constantly decreasing as its mass decreases. It is a collapsing field. It is true, the sun's gravitational field does decrease, by a minute amount, despite the fact that our sun loses a thousand million tons of matter every four minutes. The percentage change is minute, but the energy released is—immeasurable.

"But, I am going to invent a new power unit, Afthen. I will call it the 'sol,' the power of a sun. One sol is the rating of our sun. And I will measure the energy I use in terms of sunpowers, not horsepower. That may tell you of its magnitude!

"You know what a transformer is, do you not? It is a device in which one coil, the primary, builds up a magnetic field, while a second coil, the secondary, taps that changing space-field, or commonly, magnetic field, and takes that energy that it needs for itself. When the primary now lets the field fall, or collapse, the secondary again taps the field. The energy which the primary stored in space as a space-field, was tapped by the secondary, and energy which would have been available for the primary, was taken by the secondary.

"Yet remember that no matter how great the energy field of the primary coil, so long as it is not changing, the secondary coil cannot tap it, a collapsing field, or of course a rising field, is needed.

"Now a gravitational field represents energy, surely you will not question that. A collapsing gravitational field means a withdrawal of stored energy. The sun's field is collapsing, and the stored energy appears as light.

"A sun, or star, is not merely a lump of matter, a mere collection of atoms that stays helpless there, a piece of hot clay. A sun is a machine, a titanic, marvelously ingenious machine, a transformer on a scale inconceivable, a thing of forces, immense forces balanced and counterbalanced to the minutest detail. It is a transformer so huge that driblets and chips that may break from it form worlds, a transformer so huge that floods of energy may pass through it at such a rate that space itself is strained in the bearing of its powerloads. A star is a huge induction coil, in which energy is stored, an amount of energy which one may put down in cold figures, and still have no meaning. It is a very nearly perfect storage coil, but like most storage apparatus it leaks, just a trifle, a fraction of a percentage so small that in two billion years that our planets have existed, no appreciable change in that energy has taken place. Wouldn't you say it was a perfect storage machine? The sun is like a huge transformer in many ways. You know the bigger they are, the more efficient they are. Some of the biggest ones run better than 99%, and still waste 10,000 kilowatt time units.

"But the point of all this is that the sun represents an energy field in space, and further, a collapsing energy field in space. Now, from our experience with other collapsing fields, it would seem reasonable that some sort of collector could be devised that would tap this energy field just as the sun itself does, but it would be a secondary coil! That is, we could hook our wagon to a star—literally and directly! Make a star supply the power, and better than that too, for here is the stupendous thing, *every star in the universe is doing exactly the same thing! Every* star represents a collapsing energy-field, so the entire galaxy represents a collapsing energy field! Five hundred thousand million stars, five hundred thousand million power plants, every one of them destroying, on the average, one thousand million tons of matter each four minutes, two hundred and fifty million tons a minute. That's a grand total of one hundred and twenty-five thousand thousand million million tons of matter a minute.*

"I could carry that on into horsepower, but even if I did, it would just be a huge power. You probably appreciate what that means though. Infinite power, the power of all the universe, no power can be greater, for any other power source must be the destruction of matter, and our hypothetical secondary would take a levy on that as well as any other matter!

"But remember, the galaxy is losing weight by throwing its light into intergalactic space. That means that the mass of energy in the intergalactic space must be increasing. Then we have the galaxies losing weight, and the space between gaining. At some point there must be a neutral region where it neither gains nor loses. There the opposing fields, one positive, one negative, must clash. They do—and those are the cosmic ray fields.

"Now we have clews here, the rays, the structure of suns, and so forth. Several ships have gone into the sun, and penetrated to a depth of close to a hundred thousand miles, where the pressure became so enormous that even shells of solid lux would not stand it, though it was close to fifty feet thick.

"That's the data. Problem—design a secondary coil," concluded Arcot.

"And when you get this power? There is on my world a story of an old sage whose favorite pupil was enthusiastically seeking the liquid in which all things dissolve. The sage asked what the youth intended to use as a container," said Zezdon Afthen.

"Ummm—we have the same story, only it's an agriculturist and his son," grinned Morey. "We plan to keep it in the one thing that could hold it, the thing that always did hold it—space itself. As you suggest, no conceivable conductors could transmit such power. We don't intend to transmit it; we intend to use it directly, we will not make a material secondary coil; our secondary coil will be only a condition in space causing energy to become available. We will use the energy—but that is first to be determined by the machines. However, we hope to use the energy to form artificial matter."

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*125,000,000,000,000,000,000 tons.

"I understand. You will not make the 'coil' but the machine which causes the 'coil' to be made in space. That seems more conceivable." Zezdon Afthen nodded, satisfied.

"But," he continued, "while you men of Earth work on this problem, what is there for us? We have no problems, save the problem of the fate of our world, still fifty thousand years of your time in the future. It is terrible to wait, wait, wait and think of what may be happening in that other time. Is there nothing we can do to help? I know our hopeless ignorance of your science. Stel Felso Theu can scarcely understand the thoughts you use, and I can scarcely understand his explanations! I cannot help you there, with your calculations, but is there nothing I can do?"

"There is, Ortolian, decidedly. We badly need your help, and as Stel Felso Theu cannot aid us here as much as he can by working with you, I will ask him to do so. I want your knowledge of psycho-mechanical devices to help us. Will you make a machine controlled by mental impulses? I want to see such a system and know how it is done that I may control machines by such a system."

"Gladly. It will take time, for I am not the expert worker that you are, and I must make many pieces of apparatus, but I will do what I can," exclaimed Zezdon Afthen eagerly.

So, while Arcot and his group continued their work of determining the constants of the space-energy field, the others were working on the mental control apparatus.

CHAPTER XV

All-Powerful Gods

AGAIN there was a period of intense labor, while the ship drifted through time, following Earth in its mad careening about the sun, and the sun as it rushed headlong through space. With the aid of their time machine they had acquired the viewpoint of the eternal stars, every motion seemed a headlong plunge; the planets darting about were gnats moving about the mighty flame of the great energy-machine that was the sun.

But their work went on, and at the end of the thirty-day period, they had reached no definite position in their calculations, and the Talsonian reported, as a medium between the two parties of scientists, that the work of the Ortolian had not reached a level that would make a scientific understanding of the things possible.

As the ship needed no replenishing, they determined to finish their present work before landing, and it was nearly forty thousand years after their first arrival that they again landed on Earth.

It was changed now; the ice caps had retreated visibly, the Nile delta was far longer, far more prominent, and cities showed on the Earth here and there. China was a populous country, the culture well developed, their temples and many governmental institutions established. But the contacts with Ancient China were difficult, for the natives showed already that strong aversion to strangers, fleeing, or attacking at sight.

"I am afraid we had best investigate the less advanced European races," said Arcot at length.

Greece they decided would be the next stop, and to Greece they went, landing on a mountain side. Below was a village, a small thing of huts and hovels, far different from the villages of China, already a civilized nation. But the villagers were not so vastly different. They attacked, swarming up the hillside furiously, shouting and shrieking warnings of their terrible prowess to these men who came from the "shining house," ordering them to flee from them and turn over their possessions to them.

"All human nature is pretty much alike, I fear. What'll we do?" asked Morey. He and Arcot had come out alone this time.

"Take one of these fellows back with us, and question him. We had best get a more or less definite idea of what time-age we are in, hadn't we? We don't want to overshoot by a few centuries, you know!"

The villagers were swarming up the side of the hill, armed with weapons of bronze and wood. The bronze implements of murder were rare, and evidently costly, for those that had them were obviously leaders, and better dressed than the others.

"Hang it all, I have only a molecular pistol. Can't use that, it would be a plain massacre. What I want to do is to use a cosmic," exclaimed Arcot.

But suddenly several others, who had come up from one side, appeared from behind a rock. The scientists were wearing their power suits, and had them on at low power, leaving a weight of about fifty pounds. Morey, with his normal weight well over two hundred, jumped far to one side of a clumsy rush of a peasant, leaped back, and caught him from behind. Lifting the smaller man above his head, he hurled him at two others following. The three went down in a heap.

"Little fellows," grunted Arcot landing a beautiful uppercut.

Most of the men were about five feet tall, and rather lightly built. The "Greek God" had not yet materialized among them. They were probably poorly fed, and heavily worked. Only the leaders appeared to be in good physical condition, and the men could not develop to large stature. Arcot and Morey were giants among them, and with their greater skill, tremendous jumping ability, and far greater strength, easily overcame the few who had come by the side. One of the leaders was picked up, and trussed quickly in a rope a fellow had carried.

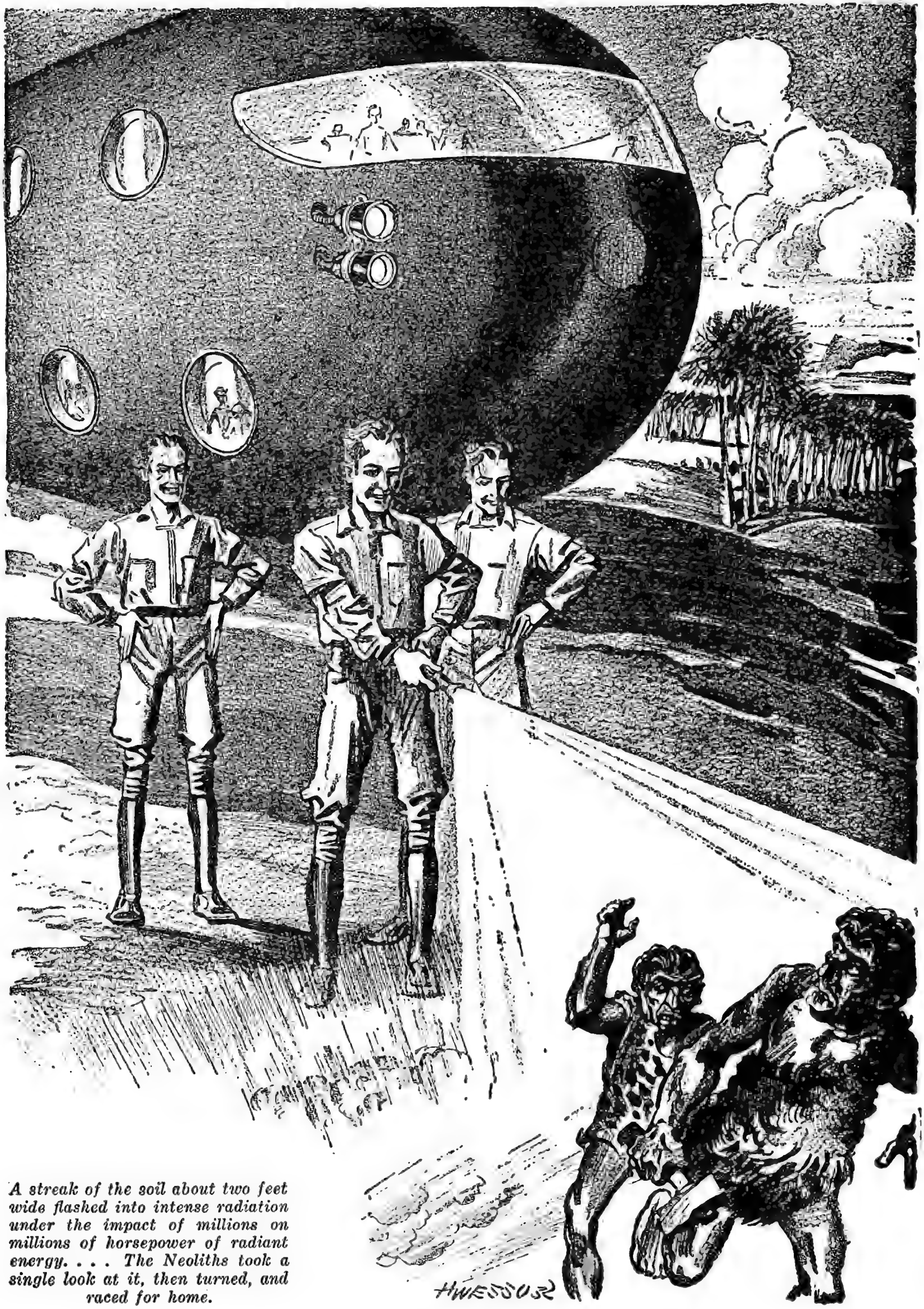
"Look out," called Wade from above. Suddenly he was standing beside them, having flown down on the power suit. "Caught your thoughts—rather Zezdon Afthen did." He handed Arcot a cosmic ray pistol. The rest of the Greeks were near now, crying in amazement, and running more slowly. They didn't seem so anxious to attack. Arcot turned the ray pistol to one side—

"WAIT!" called Morey. A face peered from around the rock toward which Arcot had aimed his pistol. It was that of a girl, about fifteen years old in appearance, but hard work had probably aged her face. Morey bent over, heaved on a small boulder, about two hundred pounds of rock, and rolled it free of the depression it rested in, then caught it on a molecular ray, and hurled it up. Arcot turned his cosmic ray on it for an instant, and it was white hot. Then the molecular ray threw it over toward the great rock, and crushed it against it. Three children shrieked and ran out from the rock, scurrying down the hillside.

The soldiers had stopped. They looked at Morey. Then they looked at the great rock, three hundred yards from him. They looked at the rock fragments.

"They think you threw it," grinned Arcot.

"What else—they saw me pick it up, saw me roll it, and it flew. What else could they think?"



A streak of the soil about two feet wide flashed into intense radiation under the impact of millions on millions of horsepower of radiant energy. . . . The Neoliths took a single look at it, then turned, and raced for home.

Arcot's cosmic ray hissed out, and the rocks sputtered and cracked, then glowed white. There was a dull explosion, and chips of rock flew up. A little water, imprisoned, had been turned into steam. In a moment the whistle and crackle of combined cosmic and molecular rays stabbing out from Arcot's hands, had built a barrier of fused rock.

Leisurely Arcot and Morey carried their now revived prisoner back to the ship, while Wade flew ahead to open the locks.

Half an hour later the prisoner was discharged, much to his surprise, and the ship rose. They had been able to learn nothing from him. Even the Greek Gods, Zeus, Hermes, Apollo, all the later Greek gods, were unknown, or so greatly changed that Arcot could not recognize them.

"Well," he said at length," it seems all we know is that they came before any historical Greeks we know of. That puts them back quite a bit, but I don't know how far. Shall we go see the Egyptians?"

They tried Egypt, a few moments across the Mediterranean, landing close to the mouth of the Nile. The people of a village near by immediately set out after them. Better prepared this time, Arcot flew out to meet them with Zezdon Afthen and Stel Felso Theu. Surely, he felt, the sight of the strange men would be no more terrifying than was the ship or the men flying. And that did not seem to deter their attack. Apparently the proverb that "Discretion is the better part of valor," had not been invented.

Arcot landed near the head of the column, and cut off two or three men from the rest with the aid of his ray pistol. Zezdon Afthen quickly searched his mind, and with Arcot's aid they determined he did not know any of the Gods that Arcot suggested. Gods are long lived, for their memory is passed from father to son, and if the Gods had not yet been invented as we know them, surely it was long before our time.

Finally they had to return to the ship, disappointed. They had had the slight satisfaction of finding that the Sun God was Ralz, the later Egyptian Ra might well have been an evolved form of that name.

They restocked the ship, fresh game and fruits again appearing on the menu, then once again they launched forth into space to wait for their own time.

"It seems to me that some effect must have been produced by our visit," said Arcot shaking his head solemnly. The subject of time-traveling, one of the ideas frequently and poorly portrayed in theaters, was one of Arcot's phobias. He did not believe in the possibility of time-traveling, and was a bit annoyed to find himself a subject to the thing he had denied. His strongest argument against time-traveling had been the "Go back and kill your grandfather as a boy" idea. In other words, the time traveler must leave an imprint on history. That past-traveling was not physically impossible, he acknowledged, but that it had happened, he denied. If it had happened, he maintained, there would have been some record, any scientist capable of doing so, would certainly have traveled extensively enough to leave his records, and probably have shared his knowledge with the past.

"We did, Arcot," replied Morey softly. "We left an impress in history, an impress that still is, and an impress that we know, that has affected countless thousands.

"Meet the Egyptian Gods with their heads strange to Terrestrians, the Gods who fly through the air without wings, come from a shining house that flies, whose look, whose pointed finger melts the desert sands, and the moist soil!" he continued softly, nodding toward the Ortolian and the Talsonian.

"Their 'impossible' Gods existed, and visited them. Indubitably some genius saw that here was a chance for fame and fortune and sold "charms" against the "Gods." Result: we are carrying with us some of the oldest deities. Again, we did leave our imprint in history."

"And," cried Wade excitedly, "meet the great Hercules, who threw men about. I always knew that Morey was a brainless brute, but I never realized the marvelous divining powers of those Greeks so perfectly as now, the Incarnation of Dumb Power!" Dramatically Wade pointed to Morey, unable even now to refrain from some unnecessary comments.

"All right, Mercury, the messenger of the Gods speaks. The little flaps on Wade's flying shoes must indeed have looked like the winged shoes of legend. Wade was Mercury, too brainless for anything but carrying the words of wisdom uttered by others.

"And Arcot," continued Morey, releasing Wade from his condescending stare, "is Jove, hurling the rock-fusing, destroying thunderbolts. Certainly nothing the Greeks knew, except the thunderbolt, could approach the power of a Cosmic."

"The Gods that my friends have been talking of," explained Arcot to the curious Ortolians, "are legendary deities of Earth. I can see now that we did leave an imprint on history in the only way we could—as Gods, for surely no other explanation could have occurred to those men."

The days passed swiftly in the ship, as their work approached completion. Finally, when the last of the equation of Time, artificial matter, and the most awful of their weapons, the unlimited Cosmic Power, had been calculated, they fell to the last stage of the work. The actual appliances were designed. Then the completed apparatus that the Ortolian and the Talsonian had been working on, was carefully investigated by the terrestrial physicists, and its mechanism studied. Arcot had great plans for this, and now it was incorporated in their control apparatus.

The one remaining trouble was time. Already their progress had brought them well up to the nineteenth century, but, as Morey sadly remarked, they couldn't tell what date, for they were sadly lacking in history. Had they known the real date, for instance, of the famous battle of Bull Run, they could have watched it in the telectroscope, and so determined their time. As it was, they knew only that it was one of the period of the first half of the decade of 1860.

"As historians, we're a bunch of first-class kitchen mechanics. Looks like we're due for another landing to locate the exact date," agreed Arcot.

"Why land now? Let's wait until we are nearer the time to which we belong, so we won't have to watch so carefully and so long," suggested Wade.

THEY argued this question for about seventy years, as a matter of fact, and finally determined to land. It was already 1930 plus. They shut off the time apparatus, and switched to the double time-field. Then they shot toward Earth. They determined on New York, and had the excellent luck of landing on a day that was abominably cloudy. They couldn't see anything with the telectroscope that would date them. Finally they moved to Boston. However, in the meantime, night had fallen.

"Let's land. What's the use of trying to avoid it. Anyhow, I'd like to mingle with those old people with their quaint dress, their old gasoline engines weighing tones, uncolored metals and all. Whatsay?

"I'm afraid our Ortolian and Talsonian friends will have to stay aboard, but we can mingle unnoticed if we wear ordinary flying clothes, *minus* our power suits and tail flaps," suggested Arcot.

"I thought you did a marvelously bum job of managing this trip. So that's why!" laughed Morey. "Go to it, Arcot."

Realizing that delay was not time-consuming in their peculiar condition, the allies agreed to wait, while the Terrestrians visited their world of two centuries ago.

The great ship was landed on an island in the harbor, its lights out, after darkness had fallen. Then the Terrestrians took off in flying suits, and power suits, and landed, at Arcot's suggestion, in Cambridge, near Massachusetts Institute of Technology. "For," as Arcot pointed out, "it's as good a place as any to learn the date, and one of the best places to land without being a center of attraction. College students in flying rig—why not? And we can, perhaps, see some of their old machines in operation instead of in a museum."

They landed in a vacant field just across the avenue from the group of buildings that represented the little old school. The Charles was still uncovered, the black waters of the basin sparkling under the lights of the bridges and the town. Such a little, dingy town, its narrow, dark streets brought home to them the almost universal squalor of the twentieth century. There was no moon, and no one about the field as they landed on a spring night.

"Boston! Lord, what a town! It's a village! Did you see the narrow, crowded streets, the dark, dingy brick buildings piled up on each other so close you couldn't get a toothpick between 'em? And people considered houses in those dingy, lightless alleys high class residences!" Arcot exclaimed.

"All of which may be true, Arcot, but don't light out so till you consider that in these times antiques were valuable, because they were old. To many people the three rules for value did not yet appear necessary; it must be unique, it must be old and it must be beautiful. They seemed contented with merely the one, and certainly they look old," replied Morey. "Also, they probably are comfortable enough inside, and artificial lighting was fairly well perfected. They had the incandescent filament bulbs and the ionized gas bulbs were just coming in, or had come in; I don't know which, yet."

"Well, let's find out," Arcot took off his power suit as he spoke, and, dressed in his close-fitting, brown rubberoid flying suit, he seemed only an aviator. They walked over toward of group of three-story buildings, passing through a wire net fence by a small gate, and left the suits in the dark alleyway between the fence and the buildings.

"Wonder what they'd be worth to a man of this time if he found 'em?" grinned Morey as he left his beside Arcot's.

"Can't imagine. Immensely valuable, but no one will find them."

"What makes you so sure, Arcot?" asked Wade dubiously.

"They'd sure make an impression on history if found, and there is no such impression." Arcot turned, and walking along the side of one building, followed its wall to Massachusetts Avenue. Bluish arc lights at intervals lighted the street dimly. Arcot smiled inwardly. Automobiles passing "swiftly" along the street, steel car rails and a trolley car attracted their attention as it rattled and clanged its noisy way along.

Little groups of people, mostly young men, were passing them on the sidewalk as they walked along. They attracted a few curious glances, but no one spoke to them. The peculiar cut of the clothes, the heavy leather shoes, the clump of hard heels and soles on the sidewalk of concrete, interested the men of an age where all shoes were soft, and the walks were as soft and yielding as the turf Nature meant man to walk upon.

A group of girls passed. Their dresses were very little more than knee length. "Knowing the rate of change of feminine fashions, we could tell very closely the year from that dress if we only were fashion experts. I must say, though, that the girls of 2130 aren't any better looking than the girls of 1930 if these are fair samples." Morey smiled approvingly.

"Probably aren't. Remember that we are Nordics, and Nordic types will be more beautiful to us. Near a college we are apt to find Nordic types, and not a fair cross-section of the race." Arcot replied in a low voice. "But we came here to find a date. I see a newspaper store up the way. Shall we go up?"

"What'll we pay with?" asked Morey.

But the problem was solved for them by Chance. An explosive exclamation and then someone fell against Arcot violently.

"Oof—Sorry. Turned my ankle, I guess." The living antique was nursing his ankle as he sat on the sidewalk.

Arcot bent over unthinking now, and helped him to his feet. His hands ran lightly over the stranger's ankle. It was already swelling a bit.

"Say, do me a favor, will you? I have my car here, and if you will run me up to my place, I'll appreciate it. I can't drive the thing now, and I can't leave it here or I'll have a three-way unfixable ticket by the time I send for it. Have a car?"

Arcot looked up, nonplussed.

The stranger stared at him in the light of the street lamp for a moment. His expression changed to one of curiosity and surprise as he looked. Arcot's strong forehead, his black, keen eyes, seemed to draw the man's gaze as a magnet draws iron. He shook himself suddenly and gasped in surprise.

"Who—who are you?"

Arcot smiled. "Sorry. Didn't mean to startle you so, and I'm afraid we can't do that for you. Can't you get one of your friends? We have to wait here a while."

"And will you tell us the date?" asked Morey, more to the point.

"Uh—why it's May 25th. Where do you come from?"

"What year?" demanded Arcot.

The man sat up, and stopped rubbing his ankle. He glanced keenly at Arcot, looked carefully at the black eyes in the half-light, and replied, "1932."

"Thanks. Sorry I can't help you—perhaps this will help explain." Arcot tossed a metal disc that rang sharply, then rolled flashing in the light. He turned, and hurried away, his friends behind him.

"The correct date," called the man on the running board of his car now, "is May 25, 1930." Arcot paused and looked back, but the other had his car started and drove away.

"Why on Earth did he do that?" asked Wade in surprise.

"To test us in the beginning, and to set us right in the end, probably. He thought we were kidding, and gave a false date to see if we'd comment on it."

They left then, and returned to the ship, starting once more for the last two hundred years of their journey.

CHAPTER XVI

Home Again

IN space once more, Arcot again started their journey through time, keeping careful count of the years as Earth swung about in its orbit like a mad planet.

Finally Arcot felt they were getting very near their own time. Indeed, he felt that they must already exist on Earth now. "One thing that puzzles me, is what would happen if we were to go down now, and see ourselves," he suggested.

"Either we can't or we don't want to do it," pointed out Morey, "because we didn't."

"I wonder which it is?" asked Arcot softly. Suddenly he sat up, and pointed to something on the screen of the telectroscope, at the same time slowing the time-field to a minimum.

"Hey—look! It's we!" Arcot exploded. "We know what time we're in now—there goes the old Solarite! That makes the second time we've watched ourselves! I'm going to find out why we can't go back and see ourselves now, or then, or whenever it was, is, or will be."

Arcot reached for the time switch, and looked at the others. They did not object, and he pulled it open. The time field collapsed, the ship seemed to reel, and the Earth suddenly flashed before them in an arc, swiftly accelerated, and became a blazing line. Suddenly it seemed to slow down, and stood motionless before them.

"Whew. That answers whether it was, couldn't or didn't want to, I guess. We couldn't," said Wade emphatically. "I feel as though every atom of me had been under a heavy load of some sort. How about you, Stel Felso Theu?"

"I was not so affected; with me it seems as though each atom had been pulled very hard. It is an indescribable sensation. I cannot know how I know that I feel thus. It is surely like nothing else."

"I think the answer is that nothing can exist two times at the same time-rate. As long as we were in a different time-rate we could exist at two times. When we tried to exist simultaneously, we could not, and we were forced to slip through time to a time wherein we either did not exist or wherein we had not yet been. Since we were nearer the time when we last existed in normal time, than we were to the time of our birth, we went to the time we left. I suspect that we will find we have just left Earth. Shall we investigate?"

"Absolutely, Arcot, and here's hoping we didn't overshoot the mark by much." As Morey intimated, had they gone much beyond the time they left Earth, they might find conditions very serious, indeed. But now they went at once toward Earth on the time control. As they neared, they looked anxiously for signs of the invasion. Arcot spotted the only evident signs, however, two large spheres, tiny points in appearance on the telectroscope screen, were circling Earth, one at about 1,000 miles, moving from east to west, the other at about 1,200 miles, moving from north to south.

"It seems the enemy have retreated to space to do their fighting. I wonder how long we were away."

As they swept down at a speed greater than light, they were invisible till Arcot slowed down near the atmosphere. Instantly half a dozen fast ships darted toward them, but the ship was very evidently unlike the Thessian ships, and no attack was made. First the occupants would have an opportunity to prove their friendliness.

"Terrestrians Arcot, Morey and Wade reporting back from exploration in space, with two friends. All have been on Earth with us previously," said Arcot into the radio vision apparatus.

"Very well, Dr. Arcot. You are going to New York or Vermont?" asked the Patrol commander.

"Vermont."

"Yes, Sir. I'll see that you aren't stopped again."

And, thanks to the message thus sent ahead, they were not, and in less than half an hour they landed once more in Vermont, on the field from which they had started.

The group of scientists who had been here on their last call had gone, which seemed natural enough to them, who had been working for three months in the interval of their trip, but to Dr. Arcot senior, as he saw them, it was a misfortune.

"Now I never will get straight all you'll have ready, and I didn't expect you back till next week. The men have all gone back to their laboratories, since that permits of better work on the part of each, but we can call them here in half an hour. I'm sure they'll want to come. What did you learn, Son, or haven't you done any calculating on your data as yet?"

"We learned plenty, and I feel quite sure that a hint of what we have would bring all those learning-hounds around us pretty quickly, Dad," laughed Arcot junior, "and believe it or not, we've been calculating on this stuff for three months since we left yesterday!"

"What!"

"Yes, it's true! We were on our time field, and turned on the space control—and a Thessian ship picked that moment to run into us. We cut the ship in half as neatly as you please, but it threw us eighty thousand years into the past. We have been coasting through time on retarded rate while Earth caught up with itself, so to speak. In the meantime—three months in a day!

"But don't call those men. Let them come to the appointment, while we do some work, and we have plenty of work to do, I assure you. We have a list of things to order from the standard supply houses, and I think you better get them for us, Dad." Arcot's manner became serious now. "We haven't gotten our Government Expense Research Cards yet, and you have. Order the stuff, and get it out here, while we get ready for it. Honestly, I believe that a few ships such as this apparatus will permit, will be enough in themselves to do the job. It really is a pity that the other men didn't have the opportunity we had for crowding much work into little time!

"But then, I wouldn't want to take that road to concentration again myself!

"Have the enemy amused you in my absence? Come on, let's sit down in the house instead of standing here in the sun."

They started toward the house, as Arcot senior explained what had happened in the short time they had been away.

"There is a friend of yours here, whom you haven't seen in some time, Son. He came with some allies."

As they entered the house, they could hear the boards creak under some heavy weight that moved across the floor, soundlessly and light of motion in itself. A shadow fell across the hall floor, and in the doorway a tremendously powerfully-built figure stood.

He seemed to overflow the doorway, nearly six and a half feet tall, and fully as wide as the door. His rugged, bronzed face was smiling pleasantly, and his deep-set eyes seemed to flash; a living force flowed from them.

"Torlos! By the Nine Planets! Torlos of Nansal! Say, I didn't expect you here, and I will not put my hand in that meat-grinder of yours," grinned Arcot happily, as Torlos stretched forth a friendly, but quite too powerful hand.

TORLOS of Nansal, that planet Arcot had discovered on his first voyage across space, far in another Island of Space, another Island Universe, was not constructed as are human beings of Earth, nor of Venus, Talso, or Ortol, but most nearly resembled, save in size, the Thessians. Their framework, instead of being stone, as is ours, was iron, their bones were pure metallic iron, far stronger than bone. On these far stronger bones were great muscles of an entirely different sort, a muscle that used heat of the body as its fuel, a muscle that was utterly tireless, and unbelievably powerful. Not a chemical engine, but a molecular motion engine, it had no chemical fatigue-products that would tire it, and needed only the constant heat supply the body sucked from the air to work indefinitely. Unlimited by waste-carrying considerations, the strength was enormous. Torlos' first demonstration of that strength to the Terrestrians when they had met him was tying a crowbar, held at arm's length, in a simple knot. Arcot had erasons for not shaking hands with this friendly giant with his two thumbs on each hand.

It was one of the commercial space freighters plying between Nansal, Sator, Earth and Venus that had brought the news of this war to him, Torlos explained, and he, as the new Trade Coordinator and Fourth of the Four who now ruled Nansal, had suggested that they go to the aid of the man who had so aided them in their great war with Sator. It was Arcot's gift of the secret of the molecular ray and the molecular ship that had enabled them to overcome their enemy of centuries, and force upon them an unwelcome peace.

Now, with a fleet of fifty interstellar, or better, intergalactic battleships, Nansal was coming to Earth's aid.

The battleships were now on patrol with all of Earth's and Venus's fleet. But the Nansalian ships were all equipped with the enormously rapid space distortion system of travel, of course, and were a shock troop in the patrol. The Terrestrian and Venerian patrols were not so equipped in full.

"And Arcot, from what I have learned from your father, it seems that I can be of real assistance," finished Torlos. Torlos had used the direct thought transference by the Venerian method that Arcot had originally taught him, and therefore Arcot alone had received his thoughts directly, but since Arcot wore the Ortolian thought apparatus, he had re-transmitted it to the others.

"All our ships," explained Torlos, "are equipped with the newest and most powerful magnetic beam apparatus. They have an amazing amount of power. I believe that no shielding short of a planetary core is sufficient to protect against the concentrated beams of ten or more of these ships."

"I wouldn't have either, Torlos, had I not read the mind of one of the Thessians. They don't shield, they neutralize. By some system of space distortion they use, they distort half of the magnetism and turn it around the other way. In other words, half of it becomes north, and the other half remains south. Result—nil! Any conceivable force, they can thus neutralize.

"I'm a lot sorrier than you are, Torlos, but I don't think the magnetism stunt works any more. But, dear old—er—er—er—let's see, Morey's Hercules, isn't he—well then, Samson, you are pronto invited on a trip we have in mind. To Eros it is. That's one of the minor planets of our system. We're going to do things to it. Watch and see!

"But now, I think, I should know what the enemy has done. I see they built some new forts."

"Yes," replied Arcot senior, "they did. They decided that the system you used on the forts of North and South poles was too effective. They moved to space, and cut off slices of Luna, pulled it over on their molecular rays, and used some of the most magnificent apparatus you ever dreamed of. I have just started working on the mathematics of it.

"They didn't come near it, but by means of rays, they released the energy of the matter very completely, apparently, and as fast as the energy came loose, a field of some sort caught it, and bound it. That was probably a very slightly modified Field B-27-e56, the kind we use in making lux and such materials. But it took them less than twelve hours to convert all that matter into relux, and then work it around where they wanted it. They moved in a short while ago.

"We sent out a fleet to do some investigating, but they attacked, and stopped work in the meantime. Whatever the ray is that can destroy matter at a distance, they are afraid that we could find its secret too easily, and block it, for they don't think it is a weapon, and it is evidently slow in action."

"Then it isn't what I thought it was," muttered Arcot junior.

"What did you think it was?" asked his father.

"Er—tell you later. Go on with the account."

"I wish," said Arcot senior, turning to Zezdon Afthen with a smile, "that you'd make these headsets transmit *all* thoughts."

"Well, to continue. We have not been idle. Following your suggestion, we built up a large ray screen apparatus, in fact, several of them, and carried them in ships to different parts of the world. Also some of the planets, lest they start dropping worlds on us. They are already in operation, sending their defensive waves against the Heaviside layer. Radio is poor, over any distance, and we can't call Venus from inside the layer now. However, we tested the protection, and it works—far more efficiently than we calculated, due to the amazing conductivity of the layer.

"If they intend to attack in that way, I suspect that it will be soon, for they are ready now, as we discovered. An attack on their fort was met with a ray screen from the fort.

"They fight with a wild viciousness now. They won't let a ship get near them. They destroy everything on sight. They seem tremendously afraid of that apparatus of yours. Too bad we had no more."

"We will have—if you will let me get to work. I see it is after sundown now, and I'm hungry. Do we eat?"

"We certainly do—all but Torlos. He ate yesterday, he says, and won't need anything till the day after tomorrow."

They ate, and while they were having coffee, it grew absolutely dark outside. In the clear air the stars winked out, and one could see the visibly moving bulk of the Thessian ship now, a point of light, still illuminated by the sun. They were sitting on the porch, looking at it, when its light suddenly winked out.

"Hmmm—in Earth's shadow," commented Wade.

"Well, long may it—Good Lord! Look!" cried Morey.

SOMEONE had spilled iridescent paint all over Earth, and it was running in dripping streams more and more from the point of contact, and the shining, iridescent stuff was spreading over the sky above, blotting out stars, and making the images of those near the edges quiver in the air. And the point of origin of the stream seemed to be directly below where they had last seen the Thessian ship.

"It's nothing but the molecular rays meeting the molecular screen. The patrol will get out after the ship in a moment, and attack it. Then the Thessians will have to use their screen, and shut down the huge ray they are throwing on Earth. Venus and the sun are protected, too, I understand. Is Mars?" asked Wade.

"Your sun is protected?" asked Stel Felso Theu.

"Yes, by ships on its surface, made entirely of relux, the heat doesn't bother them, and the rays of the Thessians can't reach the sun. Remember, nothing is too big for them to swing with molecular rays. We have swung suns a lot bigger than that sun of ours, you know, and they might well split it in two for our discomfort, or heave a few quintillion tons of it out at the Earth with molecular rays, so we just simply put up a ray plant on the sun. Our engineers are doing the same for yours, too, you know.

"But I don't know about our other planets, Dad?"

"There are ray screens on all the inferior planets, lest one of them be thrown into the sun and cause great explosions, explosions microscopic to the sun and cataclysmic to man," replied the older man.

"But let's let the rays play, and we will work," suggested Arcot junior.

They went to the ship, and entered it. Arcot senior did not follow, but the others waited, while the ship left Earth once more, and floated in space. Then they lay down and slept. After a full eight hours of sleep all around, the terrestrians were ready for sixteen hours of wakefulness, the Ortolians for nearly fifty hours, the Talsonian could work for some thirty hours, and Torlos would work till the others were all asleep.

They returned at once to Earth, but Earth was still almost exactly as they had left it. In fact, Arcot senior had not yet reached the house! For they had gone on the time speed, and though they had had plenty of sleep, and were ready to work, they had lost no terrestrial time.

They at once assembled considerable apparatus that was in sight about the ship, and in the shop and laboratory, anchored the ship firmly with a magnetic beam to the Earth's steel core, and once more speeded time. The ship lurched, and was suddenly jerking and grinding its way downward!

Arcot leaped for the controls, sailed across the room under the infinitesimal gravity of this tremendously advanced time rate, and opened the magnetic beam switch.

"Sorry—nothing serious. I forgot, and used an acceleration of one gravity on that magnetic beam, which meant 32 feet per second acceleration for this ship under normal time. We were forced through solid rock under a tremendous pressure when we speeded our time, and the time-pull of that beam. The second was disturbed by the second power, and we naturally sank right through the rock."

Arcot lifted the ship back to the surface, still on advanced time.

Then he anchored it once more, this time judging by the external effects.

The effects of their tremendous time-speed were apparent now. It was very dark outside, and what could be seen, was absolutely motionless. The lights were on inside the ship, and they wasted little time looking about, but set to work on the apparatus in the laboratory.

They worked steadily, sleeping when necessary, and the giant strength of Torlos was frequently as great an asset as his indefatigable work. He was learning rapidly, and was able to do a great deal of the work without direction. He was not a scientist, and the thing was new to him, but his position as one of the best of the secret intelligence force of Nansal had proven his brains, and he did his share.

The others, scientists all, found the operations difficult, for it had been allotted to each according to his utmost capabilities.

It was still nearly a week of their time before the apparatus was completed to the extent possible. In the meantime, Arcot had seen the folly of maintaining the high time-rate, and three days of terrestrial time had passed. They stopped, and now took into the ship what apparatus had been ordered. Now there was no need for waiting on external things, and they completed the remainder of the work under the full time-field, less than a minute of normal time passing.

Finally the unassembled, but completed apparatus, was carried to the laboratory of the cottage, and word was sent to all the men of Earth that Arcot was going to give a demonstration of the apparatus he hoped would save them. The scientists from all over Earth and Venus were interested, and those of Earth came, for there was no time for the men of Venus to arrive to inspect the results.

CHAPTER XVII

Power of Mind

It was night. The stars visible through the laboratory windows winked violently in the disturbed air of the Heaviside layer, for the molecular ray screen was still up.

The laboratory was dimly lighted now, all save the front of the room. There, a mass of compact boxes were piled one on another, and interconnected in various and indeterminate ways. And one table lay in a brilliant path of illumination. Behind it stood Arcot junior. He was talking to the dim white group of faces beyond the table, the scientists of Earth assembled.

"I have explained our power. It is the power of all the universe—Cosmic Power—which is necessarily vaster than all others combined.

"I cannot explain the control in the time I have at my disposal, but the mathematics of it, worked out in two months of constant effort, you can follow from the printed work which will appear soon.

"The second thing, which some of you have seen before, has already been partly explained. It is, in brief, artificially created matter. The two important things to remember about it are that it *is*, that it *does exist*, and that it exists *only where it is determined to exist by the control there, and nowhere else.*

"These are all coordinated under the new mental relay control. Some of you will doubt this last, but think of it under this light. Will, thought, concentration—they are efforts, they require energy. Then they can exert energy! That is the key to the whole thing.

"But now for the demonstration."

Arcot looked toward Morey, who stood off to one side. There was a heavy thud as Morey pushed a small button. The relay had closed. Arcot's mind was now connected with the controls.

A globe of cloudiness appeared. It increased in density, and was a solid, opalescent sphere.

"There is a sphere, a foot in diameter, ten feet from me," droned Arcot. The sphere was there. "It is moving to the left." The sphere moved to the left at Arcot's thought. "It is rising." The sphere rose. "It is changing to a disc two feet across." The sphere seemed to flow, and was a disc two feet across as Arcot's toneless voice of concentration continued.

"It is changing into a hand, like a human hand." The disc changed into a human hand, the fingers slightly bent, the soft, white fingers of a woman with the pink of the flesh and the wrinkles at the knuckles visible. The wrist seemed to fade gradually into nothingness, the end of the hand was as indeterminate as are things in a dream, but the hand was definite.

"The hand is reaching for the bar of lux metal on the floor." The soft, little hand moved, and reached down and grasped the half ton bar of lux metal, wrapped dainty fingers about it and lifted it smoothly and effortlessly to the table, and laid it there.

A mistiness suddenly solidified to another hand. The second hand joined the first, and fell to work on the bar. It was pinched, and the tremendously strong metal yielded like putty, while a slight flashing of energy told that there was a slight inefficiency.

The hands grasped either end of the bar, and pulled. The bar stretched finally under an enormous load. One hand let go, and the thud of the highly elastic lux metal bar's return to its original shape echoed through the soundless room. These men of the twenty-second century knew what relux and lux metals were, and knew their enormous strength. Yet it was putty under these hands. The hands that looked like a woman's!

The bar was again placed on the table, and the hands disappeared. There was a thud, and the relay had opened.

"I can't demonstrate the power I have. It is impossible. As impossible as demonstrating the destructive power of molecular rays here. The power is so enormous that nothing short of a sun could serve as a demonstration-hall. It is utterly beyond comprehension under any conditions. I have demonstrated artificial matter, and control by mental action.

"I'm now going to show you some other things we have learned. Remember, I can control perfectly the properties of artificial matter, by determining the structure it shall have.

"Watch."

Morey closed the relay. Arcot again set to work. A heavy ingot of iron was raised by a clamp that fastened itself upon it, coming from nowhere. The iron moved, and settled over the table. As it approached, a mistiness that formed became a crucible. The crucible showed the grey of pure iron, but it was artificial matter. The iron settled in the crucible, and a strange process of flowing began. The crucible became a ball, and colors flowed across its surface, till finally it was glowing richly silvery. The ball opened, and a great lump of silvery stuff was within it. It settled to the floor, and the ball disappeared, but the silvery metal did not.

"Platinum," said Morey softly. A gasp came from the audience. "Only platinum could exist there, and the matter had to rearrange itself as platinum." He could rearrange it in any form he chose, either absorbing or supplying energy of existence and energy of formation.

THE mistiness again appeared in the air, and became a globe, a globe of brown. But it changed, and disappeared. Morey recognized the signal. "He will now make the artificial matter into all the elements, and many non-existent elements, unstable, atomic figures." There followed a long series of changes, stopping finally at one weird thing. It was a new type, an atom whose configuration was unstable, but it had weirdly impossible-seeming properties. Morey described the strange stuff.

"This is one of the impossible atomic configurations, unstable, tends to collapse. We found it stable finally in a special space we succeeded in developing for it, and we have a sample. It is neither solid, liquid, nor gas! We made some by transmutation of natural matter and were able to see its properties. What is it?

"Its normal state is something new, and I can only call it solgas. It has fixed form but not fixed volume. Like a solid, its form is more or less fixed. If it is made in a cube, it remains a cube, if made a sphere it remains so. But its volume is changeable. It will expand indefinitely if not stopped. Yet, by confining it between two planes, it will stop expanding the moment any two surfaces come in contact with the planes, its shape exactly as before! It melts to a normal liquid, and when chilled, turns first to a gas, and finally, at absolute zero, to a normal solid."

The material shifted again, and again. Finally the last of the natural elements was left behind, all 104 elements known to man were shown, and many others.

"We will skip now. This is element of atomic weight 7000."

It was a lump of blackness, a lump of soft, oozy blackness. One could tell from the way that Arcot's mind handled it that it was soft. It seemed cold, terribly cold.

"It is very soft, for its atom is so large that it is soft in the molecular state. It is tremendously photoelectric, losing electrons very readily, and since its atom has so enormous a volume, its electrons are very far from the nucleus in the outer rings, and they absorb rays of very great length; even radio and some shorter audio waves seem to affect it. That accounts for its blackness, and the softness as Arcot has truly depicted it. Also, since it absorbs heat waves and changes them to electrical charges, it tends to become cold, as the frost Arcot has shown indicates. Remember, that that is infinitely hard as you see it, for it is artificial matter, but Arcot has seen natural matter forced into this exceedingly explosive atomic figuration.

"It is so heavily charged in the nucleus that its X-ray spectrum is well toward the gamma! The inner electrons can scarcely vibrate."

Again the substance changed—and was gone.

"Too far—atom of weight 20,000 becomes invisible and non-existent as space closes in about it—perhaps the origin of our space. Atoms of this weight, if breaking up, would form two or more atoms that would exist in our space, then these would be unstable, and break down further into normal atoms. We don't know."

"And one more substance," continued Morey as he opened the relay once more. Arcot sat down and rested his head in his hands. He was not accustomed to this strain, and though his mind was one of the most powerful on Earth, it was very hard for him.

"We have a substance of commercial and practical use now. Cosmium. Arcot will show one method of making it."

Arcot resumed his work, seated now. A formation reached out, and grasped the lump of platinum still on the floor. Other bars of iron were brought over from the stack of material laid ready, and piled on a broad sheet that had formed in the air, tons of it, tens of tons. Finally he stopped. There was enough. The sheet wrapped itself into a sphere, and contracted, slowly, steadily. It was rampant with energy, energy flowed from it, and the air about was glowing with ionization. There was a feeling of awful power that seeped into the minds of the watchers, and held them spellbound before the glowing, opalescent sphere. The tons of matter were compressed now to a tiny ball! Suddenly the energy flared out violently, a terrific burst of energy, ionizing the air in the entire room, and shooting it with tiny, burning sparks. Then it was over. The ball split, and became two planes. Between them was a small ball of a glistening solid. The planes moved slowly together, and the ball flattened, and flowed. It was a sheet.

A clamp of artificial matter took it, and held the paper-thin sheet, many feet square, in the air. It seemed it must bend under its own enormous weight of tons, but thin as it was it did not.

"Cosmium," said Morey softly.

Arcot crumpled it, and pressed it once more between artificial matter tools. It was a plate, thick as heavy cardboard, and two feet on a side. He set it in a holder of artificial matter, a sort of frame, and caused the controls to lock.

Taking off the headpiece he had worn, he explained, "As Morey said, Cosmium. Briefly, density, 5007.89. Tensile strength, about two hundred thousand times that of good steel!" The audience gasped. That seems little to men who do not realize what it meant. An inch of this stuff would be harder to penetrate than three miles of steel!

"Our new ship," continued Arcot, "will carry six-inch armor." Six inches would be the equivalent of eighteen miles of solid steel, with the enormous improvement that it will be concentrated, and so will have far greater resistance than any amount of steel. Its tensile strength would be the equivalent of an eighteen-mile wall of steel.

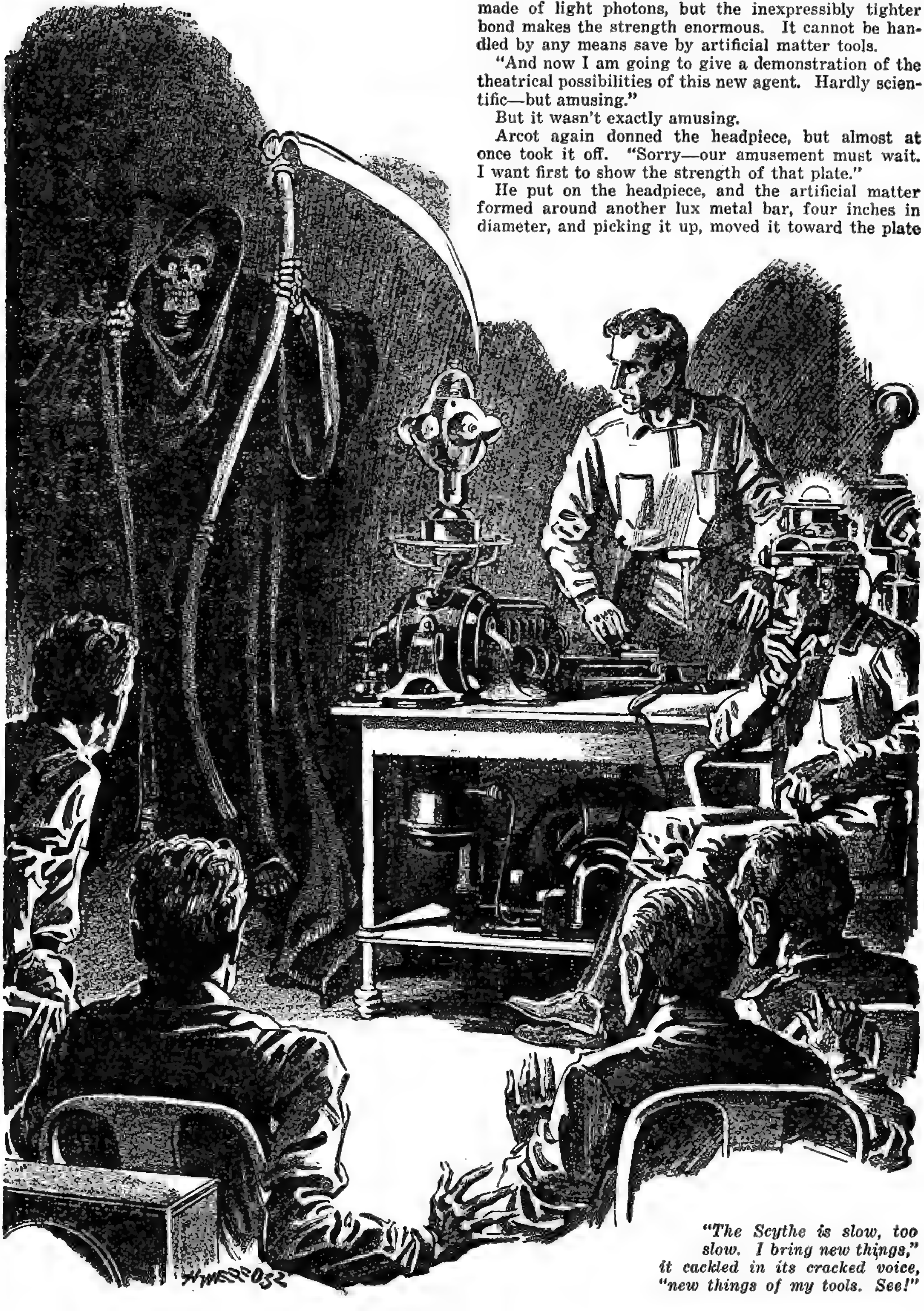
"But its most important properties are that it reflects everything we know of. Cosmics, light, and even moleculars! It is made of cosmic ray photons, as lux is made of light photons, but the inexpressibly tighter bond makes the strength enormous. It cannot be handled by any means save by artificial matter tools.

"And now I am going to give a demonstration of the theatrical possibilities of this new agent. Hardly scientific—but amusing."

But it wasn't exactly amusing.

Arcot again donned the headpiece, but almost at once took it off. "Sorry—our amusement must wait. I want first to show the strength of that plate."

He put on the headpiece, and the artificial matter formed around another lux metal bar, four inches in diameter, and picking it up, moved it toward the plate



"The Scythe is slow, too slow. I bring new things," it cackled in its cracked voice, "new things of my tools. See!"

of cosmium. The bar touched it, then it was forced against it. More and more pressure was applied, and—the four-inch lux metal bar slowly, steadily crumpled! Its enormous strength was nothing on that plate!

"It would have resisted the old twenty-inch artillery in the same way. You know their formula—twenty inches of armor at twenty-thousand yards. Twenty inches of steel—and they wouldn't have scratched this surface. Remember, diamonds won't scratch lux or relux, and the latter cut diamonds like so much mild steel, yet they won't faze this.

"But now our theatricals," smiled Arcot, removing the headpiece once more. "I think," he continued, "that a manifestation of the super-natural will be most interesting. Remember that all you see is real, and all effects are produced by artificial matter generated by the cosmic energy, as I have explained, and are controlled by my mind."

ARCOT had chosen to give this demonstration with definite reason. Apparently a bit of scientific playfulness, yet he knew that nothing is so impressive, nor so lastingly remembered as a theatrical demonstration of science. The greatest scientist likes to play with his science. Steinmetz, the great mathematical scientist of alternating current phenomena, a man who could solve problems in triple integration in his head that most men of his laboratory could not do at all, was frequently amusing himself by such pranks as electrifying a chair. A tremendous explosion is far more impressive, than the mightiest of generators, yet has far less actual power. Dynamite is not more powerful, pound for pound, than coal, yet we naturally think of dynamite as far more powerful—because it is impressive. It is a question of rate, not of quantity only.

But Arcot's experiment now—it was on a level of its own!

He resumed his headpiece. From behind the table, apparently crawling [illegible] the leg came a thing! It was a hand. A horrible, disjointed hand. It was withered and incarmined with blood, for it was severed from its wrist, and as it hunched itself along, moving by a ghastly twitching of fingers and thumb, it left a trail of red behind it. The papers to be distributed rustled as it passed, scurrying suddenly across the table, down the leg, and racing toward the light switch! By some process of writhing jerks it reached it, and s[illegible] the room was plunged into half-light—a[illegible] lights winked out. Light filtering over the transom of the door from the hall alone illuminated the hall, but the hand glowed! It glowed, and scurried away with an awful rustling that seemed a strange cackle of laughter, scuttling into some unseen hole in the wall. The quiet of the hall was the quiet of tenseness.

From the wall, coming through it, came a mistiness that solidified as it flowed across. It was far to the right, a bent stooped figure, a figure half glimpsed, but fully known, for it carried in its bony, glowing hand a great, nicked scythe. Its rattling tread echoed hollowly on the floor. Stooping walk, shuffling gait, the great metal scythe scraping on the floor, half seen as the grey, luminous cloak blew open in some unfelt breeze of its ephemeral world, revealing bone; dry, grey bone. Only the scythe seemed to know Life, and it was red with that Life. Slow running, sticky life-stuff.

Death paused, and raised his awful head. The hood fell back from the cavernous eyesockets, and they flamed with a greenish radiance that made every strained face in the room assume the same deathly pallor.

"The Scythe, the Scythe of Death," grated the rusty Voice. "The Scythe is slow, too slow. I bring new things," it cackled in its cracked voice, "new things of my tools. See!" The clutching bones dropped the rattling Scythe, and the handle broke as it fell, and rotted before their eyes. "Heh, heh," the Thing cackled as it watched. "Heh—what Death touches, rots as he leaves it." The grinning, blackened skull grinned wider, in an awful, leering cavity, rotting, twisted teeth showed. But from under his flapping robe, the skeletal hands drew something—ray pistols!

"These—these are swifter!" The Thing turned, and with a single leering glance behind, flowed once more through the wall.

A gasp, a stifled, groaning gasp ran through the hall, a half sob.

But far, far away they could hear something clanking, dragging its slow way along. Spellbound they turned to the farthest corner—and looked down the long, long road that twined off in distance. A lone, luminous figure plodded slowly along it, his half human shamble bringing him rapidly nearer.

Larger and larger he loomed, clearer and clearer became the figure, and his burden. Broken, twisted steel, or metal of some sort, twisted and blackened.

"It's over—it's over—and my toys are here. I win, I always win. For I am the spawn of Mars of War, and of Hate, the sister of War, and my toys are the things they leave behind." It gesticulated, waving the twisted stuff and now through the haze, they could see them—buildings. The framework of buildings and twisted liners, broken weapons.

It loomed nearer, the cavernous, glowing eyes under low, shaggy brown, became clear, the awful brutal hate, the lust of Death, the rotting flesh of Disease—all seemed stamped on the Horror that approached.

"Ah!" It had seen them! "Ahhh!" It dropped the buildings, the broken things, and shuffled into a run, toward them! Its face changed, the lips drew back from broken, stained teeth, the curling, cruel lips, and the rotting flesh of the face wrinkled into a grin of lust and hatred. The shaggy mop of its hair seemed to writhe and twist, the long, thin fingers grasped spasmodically as it neared. The torn, broken finger-nails were visible—nearer—nearer—nearer——

"Oh, God—stop it!" A voice shrieked out of the dark as someone leaped suddenly to his feet.

Simultaneously with the cry the Thing puffed into nothingness of energy from which it had sprung, and a great ball of clear, white glowing light came into being [illegible] the center of the room, flooding it with a light that dazzled the eyes, but calmed broken nerves.

CHAPTER XVIII

Earth's Defenses

"I AM sorry, Arcot. I did not know, for I see I might have helped, but to me, with my ideas of horror, it was as you said, amusement," said Torlos. They were sitting now in Arcot's study at the cottage; Arcot, his father, Morey, Wade, Torlos, the three Ortolians and the Talsonian.

"I know, Torlos. You see, where I made my mistake, as I have said, was in forgetting that in doing as I did, picturing horror, like a snowball rolling, it would grow greater. The idea of horror started, my mind pictured one, and it inspired greater horror, which in turn reacted on my all too reactive apparatus. As you said, the things changed as you watched, molding themselves constantly as my mind changed them, under its own initiative and the concentrated thoughts of all those others. It was a very foolish thing to do, for that last Thing—well, remember it *was*, it existed, and the idea of hate and lust it portrayed was caused by my mind, but my mind could picture what it would do, if such were its emotions, and it would do them because my mind pictured them! And *nothing* could resist it!"

Arcot's face was white once more as he thought of the danger he had run, of the terrible consequences possible of that 'amusement.'

"The Ortolians, as you know, were quite as terrified as we. Though every race and every people has its own ideas of horror, and the Ortolians felt no original fear, still the strong emotions of all those powerful minds acted so powerfully on their sensitive minds that they could not think. You others—It was my fault," finished Arcot.

"It was, Son. But I think that is no reason to waste moments so valuable as these. You say you are ready now to do the work you have to do, to make that ship you speak of. Also you neglected to tell us what the second method of making cosmium is. Why not tell me now, and start on the ship?" asked his father.

"Oh—the second method is easy enough," answered Arcot, rising to his father's bait of a scientific discussion, forgetting his depression, "since all we have to do is to release the energy of space as cosmic rays, and condense them. The experiment was not safe to try in there, so I neglected to explain it.

"I think we had best start on the ship. I'll go get some sleep now, and then we can go."

Arcot led the way to the ship, while Torlos, Morey and Wade and Stel Felso Theu accompanied him. The Ortolians were to work on Earth, aiding in the detection of attacks by means of their mental investigation of the enemy.

"Well—good-bye, Dad. Don't know when I'll be back. Maybe tomorrow, maybe twenty-five thousand years from now, or twenty-five thousand years ago. But we'll get back somehow. And we'll clean out the Thessians!"

He entered the ship, and rose into space.

"Where are you going, Arcot?" asked Morey.

"Eros," replied Arcot laconically.

"Not if my mind is working right," cried Wade suddenly. All the others were tense, listening for inaudible sounds.

"I quite agree," replied Arcot. The ship turned about, and dived toward New York, a hundred thousand miles behind now, at a speed many times that of light as Arcot snapped into time. Across the void, Zezdon Fentes' call had come—New York was to be attacked by the Thessians, New York and Chicago ne[illegible] New York because the orbits of their two forts [illegible]verging over that city in a few minutes!

They were in the atmosphere, screaming through it as their relux glowed instantaneously in the Heaviside layer, then was through before damage could be done. The screen was up.

Scarcely a minute after they passed, the entire heavens blazed into light, the roar of tremendous thunders crashing above them, great lightning bolts rent the upper air for miles as enormous energies clashed.

"Ah—they are sending everything they have against that screen, and it's hot. We have ten of our biggest tube stations working on it, and more coming in, to our total of thirty, but they have two forts, and Lord only knows how many ships.

"I think me I'm going to cause them some worrying."

Arcot turned the ship, and drove up again, now at a speed very low to them but as they had the time-field up, very great. They passed the screen, and a tremendous bolt struck the ship. Everything in it was shielded, but the static was still great enough to cause them some trouble as the time-field and electric field fought. But the time-field, because of its very nature, could work faster, and they won through undamaged, though the enormous current seemed flowing for many minutes as they drifted slowly past it. Slowly—at fifty miles a second.

Out in space, free of the atmosphere, Arcot shot out to the point where the Thessians were congregating. The shining dots of their ships and the discs of the forts were visible from Earth save for the air's distortion.

They seemed a miniature Milky Way, their deadly beams concentrated on Earth. No cosmics were being used, for the energy required to damage the entire planet was so great they could not prepare them in time. To melt all of New York they knew would do damage, but not the damage their moleculars could do if they could break through the screen.

But the Earth-stations had the advantage now, for the entire atmosphere of air, countless billions of tons, was helping to absorb the power load of the Thessian rays.

Then the Thessians discovered that the terrestrial fleet was in action. A ship glowed with the ray, the opalescence of relux under moleculars visible on its walls. It simply searched for its opponent while its relux slowly yielded. It found it in time, and the terrestrial ship put up its screen.

THE terrestrial fleet set to work, everything they had flying at the Thessian giants, but the Thessians had heavier ships, and heavier tubes. More power as Arcot had said, was winning for them. Inevitably, when the Sun's interference somewhat weakened the ray shield——

About that time Arcot arrived. The nearest fort dived toward the further with an acceleration that smashed it against no less than ten of its own ships before they could so much as move.

When the way was clear to the other fort—and that fort had moved, the berserk fort started off on a new tack—and garnered six more wrecks on its side.

Then Thett's emissaries located Arcot. The screen was up, and the Negrian attractive [illegible] apparatus which Arcot had used was working through it. The screen flashed here and there and collapsed under the full barrage of half the Thessian fleet [illegible]cot had suspected it would. But the same force [illegible] made it collapse operated a relay that turned o[illegible]he space control, and Thett's molecular ray energy streamed off to outer space.

"We worried them, they dug our hole and dragged it in after us, as usual, [illegible]damn it, we can't *hurt* them!" [illegible] Arcot disguste[illegible] All we can do is tease them, [illegible] hide where it's perfectly safe, in artificial——"

[illegible] amazement. The ship had been held under su[illegible]pace control that space was shut in about them, and they were motionless. The dials had reached a steady point, the current flow had become zero, and they had hung there with only the very slow drain of the Sun's gravitational field and that of the planet's field pulling on the ship. Suddenly the current had leaped, and the dials giving the charge in the various coil banks had moved them down toward zero.

"Hey—they've got a wedge in here and are breaking out our hole. Turn on all the generators, Morey." Arcot was all action now. Somehow, inconceivable though it was, the Thessians had spotted them, and got some means of attacking them, despite their invulnerable position in another space!

The generators were on, pouring enormous power into the coils, and the dials surged, stopped, and climbed ever so slowly. They should have jumped back under that charge, ordinarily dangerously heavy. For perhaps thirty seconds they climbed, then they started down at full speed!

Arcot's hand darted to the time field, and switched it on full. The dial jerked, swung, then swung back, and started falling in unison with the dials, stopped, and climbed. All climbed swiftly, gaining ever more rapidly. With what seemed a jerk, the time dial flew over, and back, as Arcot opened the switch. They were free, and the dial on the space control coils was climbing normally now.

“By the Nine Planets, did they drink out our energy! The energy of six tons of lead just like that! The lead was running into those disintegrators so fast, the coils it ran off of got a hot box!” called Morey, pouring a generous dose of lubricant on the supply coil bearings. The lead was fed to the main generators from wires wound on wheels, and one of these bearings had overheated.

“How’d they do it?” asked Wade.

Torlos kept silent, and helped Morey replace the coils of lead wire with others from stock.

“Same way we tickled them,” replied Arcot, carefully studying the control instruments, “with the gravity ray! We knew all along that gravitational fields drank out the energy—they simply pulled it out faster than we could pump it in, and used four different rays on us doing it. Which speaks well for a little ship! But they burned off the relux on one room here, and it’s a wreck. The molecs hit everything in it. Looks like something bad,” called Arcot. The room was Morey’s, but he’d find that out himself. “In the meantime, see if you can tell where we are. I got loose from their rays by going on both the high speed time-fields and the space control at full, with all generators going full blast. Man, they had a stranglehold on us that time! But wait till we get that new ship turned out!

“When we pulled free, the time-fields and the space control pulled for an instant. I don’t recognize the stars.”

And considering that Arcot had visited all the nearer stars, all those that had been known, and many that had not; had gone to several of the red giants and dwarf blue-white suns for experiments, that meant they were many, many light years from old Sol.

“We started off in the general direction of Talso,” said Wade hopefully.

“Maybe the photographs of the constellations *en route* to Talso will locate us,” added Morey.

But a careful examination showed no great similarity. None of the constellations were recognizable.

“From the fact that there are fewer stars ahead of us than behind us, I take it that we are very near this edge of our Island. What do you think?” asked Arcot after a moment.

“Is it impossible to return by merely follow[illegible] the [illegible]wards the line of the ship’s present progress?” asked Torlos.

“Not at all—but the chances are all against us. The ship may have come in a perfectly straight line, but it certainly came at a terrific pace, and went hundreds of thousands of light years apparently. The rate we were traveling then is an absolutely unheard-of speed. And if we diverged from the straight path by a hundredth of a degree, that would mean we would miss Sol by thousands of light years! And any star might have thrown us out that much,” replied Arcot. “Of course we can get back—but it may take a month if we have to search. We could, sooner or later, find some variable stars that have a period corresponding exactly with the period of variables known on Earth, and pick out Mira, the red giant, the second largest sun known, for it is a giant red variable, which is not a common type. With them we could work out a position.”

“Which would be all wrong,” interjected Morey smoothly, “Inasmuch as we have gone hundreds of thousands of light years—figure out the effect on the star-positions in a hundred thousand years!”

“And with that correction made, dumbell, run along home,” answered Arcot, quite as smoothly.

“It seems to me that that constellation there, somewhat resembling a man’s face in profile, but slightly askew, is the reverse of a constellation of the skies of Talso in winter,” interrupted Stel Felso Theu. “From our world the constellation is larger, and the profile is quite a bit changed, as well as the angle, but the star drift and our angle of observation may have caused the change.”

“Ahh—That means something, Stel Felso Theu, and we can save a lot of work. Instead of calculating, let’s run over to it and look. Your sun may be recognizable.”

It was clearly recognizable when they reached that constellation and then, under all possible speed with the time apparatus, they headed for home. Still it was slow, so Arcot tried once more with the space apparatus as well. With the time apparatus throwing them into a different time-rate, and the space apparatus giving them other space-characteristics, they were safe as to collisions with stars, as they had been on the outward inadvertent trip. They reached Earth after less than half an hour.

THEY did not land, but with the telectroscope they could see what was happening. The terrific bombardment of rays was continuing, and the fleets were locked now in a struggle, the combined fleets of Earth and Venus and of Nansal, far across the void. Many of the terrestrian, or better, Solarion ships, were equipped with space distortion apparatus, now, and had some measure of safety in that the attractive rays of the Thessians could not be so concentrated on them. In numbers was safety, Arcot had been endangered because he was practically alone at the time they attacked.

But it was obvious that the Solarian fleet was losing. They could not compete with the heavier ships, and now the frequent flaming bursts of light that told of a ship caught in the new deadly ray showed another danger.

“I think Earth is lost if you cannot aid it soon, Arcot, for other Thessian ships are coming,” said Stel Felso Theu softly.

From out of the plane of the planetary orbits they were coming, across space from some other world, a fleet of dozens of them. They were visible as one after another leapt into normal time-rates.

“Why don’t they fight in advanced time?” asked Morey, half[illegible]d.

“[illegible] great [illegible] genius that designed that apparatus [illegible]. Remember, Morey, those ships have their time apparatus connected with their power apparatus so that the power has to feed the time continuously. They have no coils like ours. When they advance their time, they’re weakened every other way.

“We need that new ship. Are we going to make it?” demanded Arcot.

“Take weeks at best. What chance?” asked Morey.

“Plenty; watch.” As he spoke, Arcot pulled open the time controls, and spun the ship about. They headed off toward a tiny point of light far beyond. It rushed toward them, grew with the swiftness of an exploding bomb, and was suddenly a great, rough fragment of a planet hanging before them, miles in extent.

“Eros,” explained Wade laconically to Torlos. “Part of an ancient planet that was destroyed before the time of man, or life on Earth. The planet got too near the sun when its orbit was irregular, and old Sol pulled it to pieces. This is one of the pieces. The other asteroids are the rest. All planetary surfaces are made up of great blocks, they aren’t continuous, you know. Like blocks of concrete in a building, they can slide a bit on each other, but friction holds them till they slip with a jar and we have earthquakes. This is one of the planetary blocks. We see Eros from Earth intermittently, for when this thing turns broadside it reflects a lot of light; edge on it does not reflect so much.”

It was a desolate bit of rock. Bare, airless, waterless rock, of enormous extent. It was contorted and twisted, but there were no great cracks in it, for it was a single planetary block.

Arcot dropped the ship to the barren surface, and anchored it with an attractive ray at low concentration. There was no gravity of consequence on this bit of rock.

"Come on, get to work. Space suits, and rush all the apparatus out," snapped Arcot. He was on his feet, the power of the ship in neutral now. Only the attractor was on. In the shortest possible time they got into their suits, and under Arcot's direction set up the apparatus on the rocky soil as fast as it was brought out. In all, less than fifteen minutes were needed, yet Arcot was hurrying them more and more. Torlos' tremendous strength helped, even on this gravitationless world, for he could accelerate more quickly with his burdens.

At last it was set up for operation. The artificial matter apparatus was operated by cosmic power, and controlled by mental operation, or by mathematical formula as they pleased.

Immediately Arcot set to work. A giant hollow cylinder drilled a great hole completely through the thin, curved surface of the ancient planetary block, through twelve miles of solid rock—a cylinder of artificial matter created on a scale possible only to cosmic power. The cylinder, half a mile across contained a huge plug of matter. Then the artificial matter contracted swiftly, compressing the matter, and simultaneously treating it with the tremendous fields that changed its energy form. In seconds it was a tremendous mass of cosmium.

A second smaller cylinder bored a plug from the rock, and worked on it. A huge mass of relux resulted. Now other artificial matter tools set to work at Arcot's bidding, and cut pieces from his huge masses of raw materials, and literally, quick as thought, built a great framework of them, anchored in the solid rock of the planetoid.

Then a tremendous plane of matter formed, and neatly bisected the planetoid, two great flat pieces of rock were left where one had been—miles across, miles thick—planetary chips.

On the great framework that had been constructed, four tall shafts of cosmium appeared, and each was a hollow tube, up the center of which [illegible] a huge cable of relux. At the peak of each mile-high shaft was a great globe. Now in the framework below things were materializing as Arcot's flying thoughts arranged them—great tubes of cosmium with relux elements—huge coils of relux conductors, insulated with microscopic but impenetrable layers of cosmium.

Still, for all his swiftness of mind and accuracy of thought, he had to correct only two mistakes in all his work. It was nearly an hour before the thing was finished. Then, two hundred feet long, a hundred wide, and fifty in height, the great mechanism was completed, the tall columns rising from four corners of the greater framework that supported it.

Then, into it, Arcot turned the powers of the cosmos. The stars in the airless space wavered and danced as though seen through a thick atmosphere. Tingling power ran through them as it flowed into the tremendous coils. For thirty seconds—then the heavens were as before.

At last Arcot spoke. Through the radio communicators, and through the thought-channels, his ideas came as he took off the headpiece. "It's done now, and we can rest." There was a tremendous crash from within the apparatus. The heavens reeled before them, and shifted, then were still, but the stars were changed. The sun shone weirdly, and the stars were altered.

"That is a time shifting apparatus on a slightly larger scale," replied Arcot to Torlos' question, "and is designed to give us a chance to work. Come on, let's sleep. A week here should be a few minutes of Earth-time."

"You sleep, Arcot. I'll prepare the materials for you," suggested Morey. So Arcot and Wade went to sleep, while Morey and the Talsonian and Torlos worked. First Morey bound the *Ancient Mariner* to the frame of the time apparatus, safely away from the four luminous balls, broadcasters of the time field. Then he shut off the attractive ray, and bound himself in the operator's seat of the apparatus of the artificial matter machine.

A plane of artificial matter formed, and a stretch of rock rose under its lift as it clove the rock apart. A great cleared, level space resulted. Other artificial matter enclosed the rock, and the fragments cut free were treated under tremendous pressure. In a few moments a second enormous mass of cosmium was formed.

For three hours Morey worked steadily, building a tremendous reserve of materials. Lux metal he did not make, but relux, the infusible, perfect conductor, and cosmium in tremendous masses, he did make.

And he made some great blocks of oxygen from the rock, transmuting the atoms, and stored it frozen on the plane, with liquid hydrogen in huge tanks, and some metals that would be needed. Then he slept while they waited for Arcot.

Eight hours after he had lain down, Arcot was up, and ate his breakfast. He set to work at once with the machine. It didn't suit him, it seemed, and first he made a new tool, a small ship that could move about, propelled by a piece of artificial matter, and the entire ship was a tremendously greater artificial matter machine, with a greater power than before!

His thoughts, far faster [illegible] hands could move, built up the gigantic hull of the new ship, and put in the rooms and the brace members in less than twelve hours. A titanic shell of eight-inch cosmium, a space, with braces of the same non-conductor of heat, cosmium, and a two inch inner hull. A tiny space in the gigantic hull, a space less than one thousand cubic feet in dimension was the control and living quarters.

It was held now on great cosmium springs, but Arcot was not by any means through. One man must do all the work, for one brain must design it, and though he received the constant advice and help of Morey and the others, it was his brain that pictured the thing that was built.

At last the hull was completed. A single, glistening tube, of enormous bulk, a mile in length, a thousand feet in diameter. Yet nearly all of that great bulk would be used immediately. Some room would be left for additional apparatus they might care to install. Spare parts they did not have to carry—they could make their own from the energy abounding in space.

The enormous, shining hull was a thing of beauty through stark grandeur now, but obviously incomplete. The ray projectors were not mounted, but they were to be ray projectors of a type never before possible. Space is the transmitter of all rays, and it is in space that those energy forms exist. Arcot had merely to transfer the enormously high energy level of the space-curvature to any form of energy he wanted, and now, with the complete statistics on it, he was able to do that directly. No tubes, no generators, only fields that changed the energy already there—the immeasurable energy available!

The next period of work he started the space distortion apparatus. That must go at the exact center of the ship. One tremendous coil, big enough for the *Ancient Mariner* to lie in easily! Minutes, and flying thoughts had made it—then came thousands of the individual coils, by thinking of one, and picturing it many times! In ranks, rows, and columns they were piled into a great block, for power must be stored for use of this tremendous machine, while in the artificial space when its normal power was not available, and that power source must be tremendous.

Then the time apparatus, and after that the driving apparatus. Not the molecular drive now, but an attraction drive, an attraction ray focused on their own ship, with projectors scattered about the ship that it might move effortlessly in every direction. And provision was made for a force-drive by means of artificial matter, planes of it pushing the ship where it was wanted. But with the attraction-drive they would be able to land safely, without fear of being crushed by their own weight on Thett, for all its enormous gravity.

The control was now suspended finally, with a series of attraction drives about it, locking it immovably in place, while smaller attraction devices stimulated gravity for the occupants.

Then finally the main apparatus—the power plant—was installed. The enormous coils which handled, or better, caused space to handle as they directed, powers so great that whole suns could be blasted instantaneously, were put in place, and the field generators that would make and direct their rays, their ray screen if need be, and handle their artificial matter. Everything was installed, and all but a rather small space was occupied.

It had been six weeks of continuous work for them, for the mind of each was aiding in this work, indirectly or directly, and it neared completion now.

"But, we need one more thing, Arcot. That could never land on any planet smaller than Jupiter. What is its mass?" suggested Morey.

"Don't know, I'm sure, but it is of the order of a billion tons. I know you are right. What are we going to do?"

"Put on a tender."

"Why not the *Ancient Mariner*?" asked Wade.

"It isn't fitting. It was designed for individual use anyway," replied Morey. "I suggest something more like this on a small scale. We won't have much work on that, merely think of every detail of the big ship on a small scale, with the exception of the control cube furnishings. Instead of the numerous decks, swimming pool and so forth, have a large, single room."

"Good enough," replied Arcot.

As if by magic, a machine appeared, a "small" machine of two-hundred-foot length, modified slightly in some parts, its bottom flattened, and equipped with an attractor anchor. Then they were ready.

"We will leave the *Mariner* here, and get it later. This apparatus won't be needed any longer, and we don't want the enemy to get it. Our trial trip will be a fight!" called Arcot as he leaped from his seat . The mass of the giant ship pulled him, and he fell slowly toward it.

Into its open port he flew, the others behind him, their suits still on. The door shut behind them as Arcot, at the controls, closed it. As yet they had not released the air supplies. It was airless.

Now the hiss or air, and the quickening of heat crept through it. The water in the tanks thawed as the heat came, soaking through from the great heaters. In minutes the air and heat were normal throughout the great bulk. There was air in the power compartments, though no one was expected to go there, for the control room alone need be occupied; vision-screens here viewed every part of the ship, and all about it.

The eyes of the new ship were set in recesses of the tremendously strong cosmium wall, and over them, protecting them, was an infinitely thin, but infinitely strong wall of artificial matter, permanently maintained. It was opaque to all forms of radiation known from the longest Hertzian to the shortest cosmics, save for the very narrow band of visible light. Whether this protection would stop the Thessian beam that was so deadly to lux and relux was not, of course, known. But Arcot hoped it would, and, if that beam was radiant energy, or material particles, it would.

"We'll destroy our station here now, and leave the *Ancient Mariner* where it is. Of course we are a long way out of the orbit this planetoid followed, due to the effect of the time apparatus, but we can note where it is, and we'll be able to find it when we want it," said Arcot, seated at the great control board now. There were no buttons now, or visible controls; all was mental.

A tiny sphere of artificial matter formed, and shot toward the control board of the time machine outside. It depressed the main switch, and space about them shifted, twisted, and returned to normal. The time apparatus was off for the first time in six weeks.

"Can't fuse that, and we can't crush it. It's made of cosmium, and trying to crush it against the rock would just drive it into it. We'll see what we can do though," muttered Arcot. A plane of artificial matter formed just beneath it, and sheared it from its bed on the planetoid, cutting through the heavy cosmium anchors. The framework lifted, and the apparatus with it. A series of planes, a gigantic honeycomb formed, and the apparatus was cut across again and again, till only small fragments were left of it. Then these were rolled into a ball, and crushed by a sphere of artificial matter beyond all repair. The enemy would never learn their secret.

A huge cylinder of artificial matter cut a great gouge from the plane that was left where the apparatus had been, and a clamp of the same material picked up the *Ancient Mariner*, deposited it there, then covered it with rubble and broken rock. A cosmic flashed on the rock for an instant, and it was glowing, incandescent lava. The *Ancient Mariner* was buried under a hundred feet of rapidly solidifying rock, but rock which could be fused away from its infusible walls when the time came.

"We're ready to go now—get to work with the radio, Morey, when we get to Earth."

The gravity seemed normal here as they walked about, no accelerations affected them as the ship darted forward, for all its inconceivably great mass, like an arrow, then flashed forward under time control. The sun was far distant now, for six weeks they had been traveling with the section of Eros under time control. But with their tremendous time control plant, and the space control, they reached the solar system in very little time.

It seemed impossible to them that that battle could still be waging, but it was. The ships of Earth and Venus, battling now as a last, hopeless stand, over Chicago, were attempting to stop the press of a great Thessian fleet. Thin, long Negrian, or Sirian ships had joined them in the hour of Earth time that the men had been working. Still, despite the reenforcements, they were falling back.

CHAPTER XIX

The Battle of Earth

IT had been an anxious hour for the forces of the Solar System. General Hetsar Sthel, of Kaxor, Venus, in charge of the defense, with the advice and aid of the General Staff, had thrown in all his forces. The great ray stations of the cities would be a last defense after the ships entered the air, but they would be mere retaliation, for once Thett got inside Earth's atmosphere, inside the great Heaviside layer ray-screen, her rays would be loosed on all the cities. The few stations that would operate had ray screens—but not the billions of the cities. It would be retaliation, not defense.

The struggle was to keep the Thessians from the air, and it was a hopeless struggle. For some time, because Earth's forces had, by sheer sacrifice, held the Thessians off, they were able to gain when the aid from Venus came. A ship was dispatched at once to Sirius for aid, had returned to report aid on the way, for Sirius had been relieved of attack when Thett sent all ships to this planet for the great attack.

The forces of Earth and Venus were small ships, in general, and carried only small ray screens. They failed instantly before the tremendous projectors of the Thessian battleships, so for a long time the Solarians had not used their screens, but going on the daylight side of the Thessians, where their ships were black in black space, and the Thessian ships bright spots, they had used no screens, and bombarded the great ships with molecular rays. Slowly their relux was eaten away by the smaller Solarian ships, while Solarian after Solarian was found, spotted with the molecular ray and destroyed, or blazed into a torch, revealing its hull, as the destructive ray touched the ship.

But many Thessian ships went to destruction in this. And many, poorly armored against magnetism, went suddenly dead as the concentrated force of several Nansalian battleships hit them.

The Nansalian ships were larger, and carried heavier screens now. They easily fought it out with one or two rays from Thessian ships, probing with deadly magnetic rays, sometimes finding some machine, sometimes a man who was not under the magnetic screen. A man unprotected meant the failure of some machine temporarily, and they had a chance to break through the armor.

But the greater size of the Nansalian ships made them constant targets. The Thessian ships joined in attacking them, as well as the few true battleships Earth possessed.

One new one had just been completed, designed under Arcot's advice. It carried a double ray screen, six foot relux, and the space- and time-distortion apparatus. Time after time it escaped into space by the use of the space-distortion as some Thessian charged down. And ship after ship they destroyed by lowering their heavy screens, and pouring all their power of six prow projectors against a Thessian ship. But eventually one of the giant forts crept too near—and it disappeared in a blaze of incandescence.

They were in the last fine stages of Earth's atmosphere when the general staff received notice that a radio message of tremendous power had penetrated the ray screen, with advice for them. It was signed "Arcot."

"Bringing new weapon. Draw all ships within the atmosphere when I start action, and drive Thessians back into space. Retire as soon as a distance of ten thousand miles is reached. I will then handle the fleet," was the message.

"Gentlemen: We are losing. The move suggested would be eminently poor tactics unless we are sure of being able to drive them. If we don't, we are lost in any event. I trust Arcot. How vote you?" asked General Hetsar Sthel.

The message was relayed to the ships. Scarcely a moment after the message had been relayed, a tremendous battleship appeared in space, just beyond the battle. It shot forward, and planted itself directly in the midst of the battle, brushing aside two huge Thessians in its progress. The Thessian ships bounced off its sides, and reeled away. It lay waiting, making no move. All the Thessian ships above poured the full concentration of their moleculars into its tremendous bulk. A diffused glow of opalescence ran over every ship—save the giant. The moleculars were being reflected from its sides, and their diffused energy attacked the very ships that were sending them!

A fort moved up, and the deadly beam of destruction reached out, luminous even in space.

"Now," muttered Morey," we shall see what cosmium will stand."

Suddenly the screens went blank, all save those inside the ship, the eyes outside had been destroyed by the ray.

"Which means it is nothing in the spectrum, or that artificial matter would stop it," commented Wade.

A huge spot on the side of the ship had become incandescent. A vapor, a strange puff of smokiness exploded from it, and disappeared instantly. Another came and faster and faster they followed each other. The cosmium was disintegrating under the ray, but very slowly, breaking first into gaseous cosmic rays, then free, and spreading.

"We will now fight," muttered Morey happily as he saw Arcot shift in his seat.

Arcot picked the moleculars. They reached out, touched the heavy relux of the fort, and it exploded into opalescence that was hazily white, the colors shifted so quickly. A screen sprang into being, and the ray was chopped off. The screen was a mass of darting flames as energies of stupendous magnitude clashed.

ARCOT used a bit more of his inconceivable power. The ray struck the screen, and it flashed once—then died into blackness. The fort suddenly crumpled in like a dented can, and rolled clumsily away. The other fort was near now, and started an attack of its own. Arcot chose the artificial matter this time. He was not watching the many attacking ships.

The great ship careened suddenly, fell over heavily to one side. "Foolish of me," said Arcot. "They tried crashing us. See—there, with the new eyes in you can see him."

A mass of crumpled, broken relux and lux, surrounded by a haze of gas lying against a slight scratch on the great side told the story. Eight inches of cosmium does not give way.

Yet another ship tried it. But it stopped several feet away from the real wall of the ship. It struck a wall even more unyielding—artificial matter. Arcot had surrounded the ship with a sheet of artificial matter.

But now Arcot was using this major weapon—artificial matter. Ship after ship, whether fleeing or attacking, was surrounded suddenly by a great sphere of it, a sudden terrific blaze of energy as the sphere struck the ray shield, the control forces now backed by the energy of all the millions of stars of space shattered it in an instant. Then came the inexorable crush of the artificial matter, and a ball of matter alone remained.

But the pressing disc of the battle-front which had been lowering on Chicago, greatest of Earth's metropolises, was lifted. This disc-front was staggering back now as Arcot's mighty ship weakened its strength, and destroyed its morale, under the steady drive of the now hopeful Solarians.

The other gigantic fort moved up now, with twenty of the largest battleships. The fort turned loose its destructive ray—and Arcot tried his new "magnet." It was not a true magnet, but a transformed space field, a field created by the energy of all the universe.

The fort was gigantic. Even Arcot's mighty ship was a small thing beside it, but suddenly it seemed warped and twisted as space curved visibly in a magnetic field of such terrific intensity as to be immeasurable. Earth, out of the direct range of the great beam, trembled under its pull, and earthquakes, like monstrous tides, were stirred up in it. The giant ship lurched terrifically under its pull—and Arcot turned on one other weapon. It was an apparatus designed for inducing enormous currents in any apparatus made of relux. Simply a diffused cosmic ray, for relux, under a cosmic ray, and in a magnetic field is a conductor, and also a generator.

It was inevitable. The fort was made of relux. Currents were suddenly generated in it, and those currents heated it almost instantly to incandescence—then it shook terrifically as those currents reacted on the magnetic field, the resistance stopped them, the magnetic field drove them—and the relux took the strain. The great wall was pulverized, shattered to dust, and the dust scattered by suddenly expanding air.

There was double reason in using one weapon after another in this way. For one thing Arcot learned their manipulation, and their effectiveness. For another, the display of innumerable and terribly efficacious weapons did not help the morale of the already retreating Thessian fleet.

Moleculars had been beating harmlessly against the cosmium walls of the ship, and cosmics had bathed it. The eyes did not fail, but each little socket became a point of light as artificial matter and cosmic ray energy battled, with the inevitable result when the energy of matter fought the energy of the Universe. No effect was produced on the ship.

But now Arcot threw out a molecular ray screen, generated directly in space, no apparatus of tubes handled this, and no apparatus of tubes could bother it. But the Thessian battleships poured their futile energy into blazing interference on it.

And his last new weapon, the Sirian attractive ray, he tried now. Two battleships were caught by two beams. The ships leapt forward at an acceleration that yanked them to a speed of thousands of miles per second in mere miles of distance. Then they were released. They turned their maximum acceleration to deflect themselves from the inevitable collision—but at that speed no bearable force could turn them half a diameter in the distance they had of safety. They crashed and relux against relux, the crash was an enormous explosion of energy.

Arcot's armory was tested and found not wanting.

Suddenly every Thessian ship in sight, ceased to exist. They disappeared. Instantly Arcot threw on all time power, and darted toward Venus. The Thessians were already nearing the planet, and no possible rays could overtake them. An instantaneous touch of the space control, and the mighty ship was within hundreds of miles of the atmosphere.

Space twisted about them, reeled, and was firm. The Thessian fleet was before them in a moment, visible now as they slowed to normal speed. Startled they were no doubt to find the ship they had fled from waiting before them. But they charged on for a space. Then, as though by some magic, they stopped and exploded in gouts of light.

When space had twisted, seconds before, it was because Arcot had drawn on the enormous power of space to an extent that had been appreciable even to it—ten sols. That was forty million tons of matter a second, and for a hundredth part of a second it had flowed. Before them, in a vast plane, had been created an infinitesimally thin film of artificial matter, four hundred thousand tons of it, and into this invisible, infinitely hard barrier, the Thessian fleet had rammed. And it was gone.

"I think," said Arcot softly, as he took off his headpiece, "that the beginning of the end is in sight."

"And I," said Morey, "think it is now out of sight. Half a dozen ships stopped. And they are gone now, to warn the others."

"What warning? What can they tell? Only that their ships were destroyed by something they couldn't see," smiled Arcot. "I'm going home."

CHAPTER XX

Destruction

THEY could not land on Earth. Not with their huge machine, but they brought it down to Chicago, and hung out over the lake, while Arcot went in the tender, and picked up a number of delegates. Arcot Senior was there, and Morey Senior too, General Hetsar Sthel, and the General Staff came *en masse*, with a number of important scientists, who were near enough to get there in time.

"I cannot explain all this apparatus to you. But I want you to understand that this ship represents not an hour's labor, but six weeks work, constant work, with the most titanic powers the Universe has ever yielded to man.

"I will show you the machine, and you will get an impression of it only. I cannot stay long, for I must go to those other worlds with what aid I can give. But we are in the tender room now. This room," said Arcot pointing about at the great cosmium, arched ceiling, "is designed solely to hold this ship, which will be anchored in place when we leave it. It alone weighs in the order of a quarter of a million tons, and could make the intergalactic journey itself.

"This is the main driving engine. It is better to say, it controls the driving power." He pointed as he spoke, to an apparatus the height of a man, and its humped bulk was approximately ten feet long.

The General looked at it skeptically. "Do you mean that that apparatus alone drives this enormous thing?" he asked.

"It causes it to be driven," smiled Arcot, "because it causes space to form the field which actually drives."

The room they had entered was fully one hundred feet high, and two hundred long, by one hundred and seventy-five wide. The driving apparatus occupied one corner. Down both walls, in great stacks, held in cosmium insulating pots, were rows on rows of enormous coils, twenty feet in diameter, the two toruses, or doughnut shaped coils at right angles to each other, the space in their intersection was the absolute black of that other space they contained.

"These are the space distortion power coils. This is one of the three banks, any one of which is sufficient to carry us. Due to the necessary limitations of the relux conductors, it takes us five minutes to charge any one bank. That machine beside the normal space drive supplies the power." Again it was absurdly small.

But there was one thing that bulked enormous in the center of the room, filling all the space between the walls of coils. It was a single cylindrical coil.

"That," explained Arcot pointing toward it, "is the main space distortion coil. There are two, that or the other one may be used. Both are never used at once. Either one will give us a velocity of thirty-five light years a second, *per se*."

Flying across the room on the molecular suits that each had worn, they entered a titanic chaos of machines. Machines so huge that entire towns, it seemed, could have been built on their enormous backs.

"Son, what are those machines?" asked Arcot Senior in amazement.

"The central one, the largest of all, is the artificial matter feed apparatus. The one to the left is the projector feed. It will feed the projectors with any type of feed-field I want, and produce any type of ray that exists in space. I do not know its power, nor do I know the power of the artificial matter feed. Each can handle the power of more than one billion sols, however."

"And what," asked Arcot Senior softly, "would that do?"

"It would be sufficient to create a new universe, or completely wreck an old one," replied Morey Junior, who had appeared.

"The other converter, to the right, and those other two, fore and aft of the master feed, are other projector feeders. We can throw four different types of ray at once, if we want, and each ray will be backed with the power of one billion suns!

"The smaller machines about are for different purposes. That down there is the control, where the mental impulses are converted to mechanical and electrical action. That is the magnetic ray. I'm sorry I touched Earth with it. I understand it caused considerable damage."

"That! That threw the ray that rocked old Earth?" asked one of the General Staff, looking in horror at the machine, which was no bigger than a private molecular ship, and yet was capable of rocking a planet to the core.

"That did it. It's made of pure cosmium, and anchored with artificial matter plates. The other machines around here have the job of maintaining in place the various permanent artificial matter structures. The lights—those globes of white fire apparently floating in the air, are structures of artificial matter. They are under my mental control even now. See."

Arcot stared upwards, and the lights, which had been shining steadily with a glow rather than a glare, suddenly brightened, until they were white furnaces of light. The gigantic room was quickly warming, and in moments the radiated energy had made it uncomfortable. But the lights dimmed, and in a few seconds the molecular cooling had absorbed the energy.

"IF any enemy should force an entrance to this room I could turn the power into those lights till this power room was a white hot *inferno*, in which every element would be a gas, except only the cosmium and relux of which it is constructed, which could exist in solid form. The same is true of every part of the ship, and every part of the ship is guarded by those eyes you see up there. They watch every room, and relay the views to the screens in the ships control room—but also, when I have accustomed myself to it, I can have those scenes projected directly upon my mind, so that I am continually conscious of every part of the ship, as I am conscious of every part of my body. By merely desiring it, any one screen's impression may be intensified, and observed minutely, as the impression of any nerve of the body can, by willing, be made more clear, more definite.

"But as yet I can only use the standard controls. I need practice.

"But gentlemen I have to repair the cosmium of the ship. It was pitted a bit in some spots by their rays, and I want to repair it. Let us go to the control room."

"Dr. Arcot. There is one question I should like to ask. Do you think the enormous powers of those generators is necessary?" asked General Hetsar Sthel.

"I sincerely hope not, General Sthel, but as a matter of fact they are not generators. They do not generate power; they merely turn it; convert it. They are no more generators than is a transformer for electrical power. Save if an electrical transformer were on the same scale to the power handled as these machines are, you would be unable to see it with the average microscope!"

The General looked again at the apparatus which had rocked the terrestrial planet, when a stray edge of the beam it threw had touched it, and then at the gigantic central machine, and the four slightly smaller projector feeders. He shook his head, and turned away.

In the control room, Arcot at once seated himself, and the ship darted up, Chicago with its multitude of colors, flashing now in the early morning sun dropping behind. In a few seconds the scream of the air had died out, the space was black around them.

Out in front of the ship a transparent sphere formed. Within it a pair of planes formed, and moved slowly toward each other. They touched, and a terrific burst of energy evidently escaped, for the meters on the control board suddenly jiggled slightly, and the one which read in millisols of power used registered in the neighborhood of five. Five thousandths of a sun power. The meter hung steady, and the planes within the sphere of transparency seemed to waiver, and move about like pieces of cloth, while they glowed with a strange violet glare. For perhaps ten seconds this continued, then Arcot stopped it. The planes vanished; the sphere closed in inexorably, and suddenly, as if by magic, the empty space within the sphere was filled with solid, reflecting mass.

"Cosmium," explained Morey *sotto voce*, "He pushed two artificial matter planes together, and they radiated in the cosmic principally, and the sphere-shield he used was a perfect reflector of cosmics, though transparent to light. When the cosmic energy had accumulated sufficiently, he closed in the sphere against its enormous pressure, and then subjected the whole to the correct field—and the cosmics crystallized into cosmium."

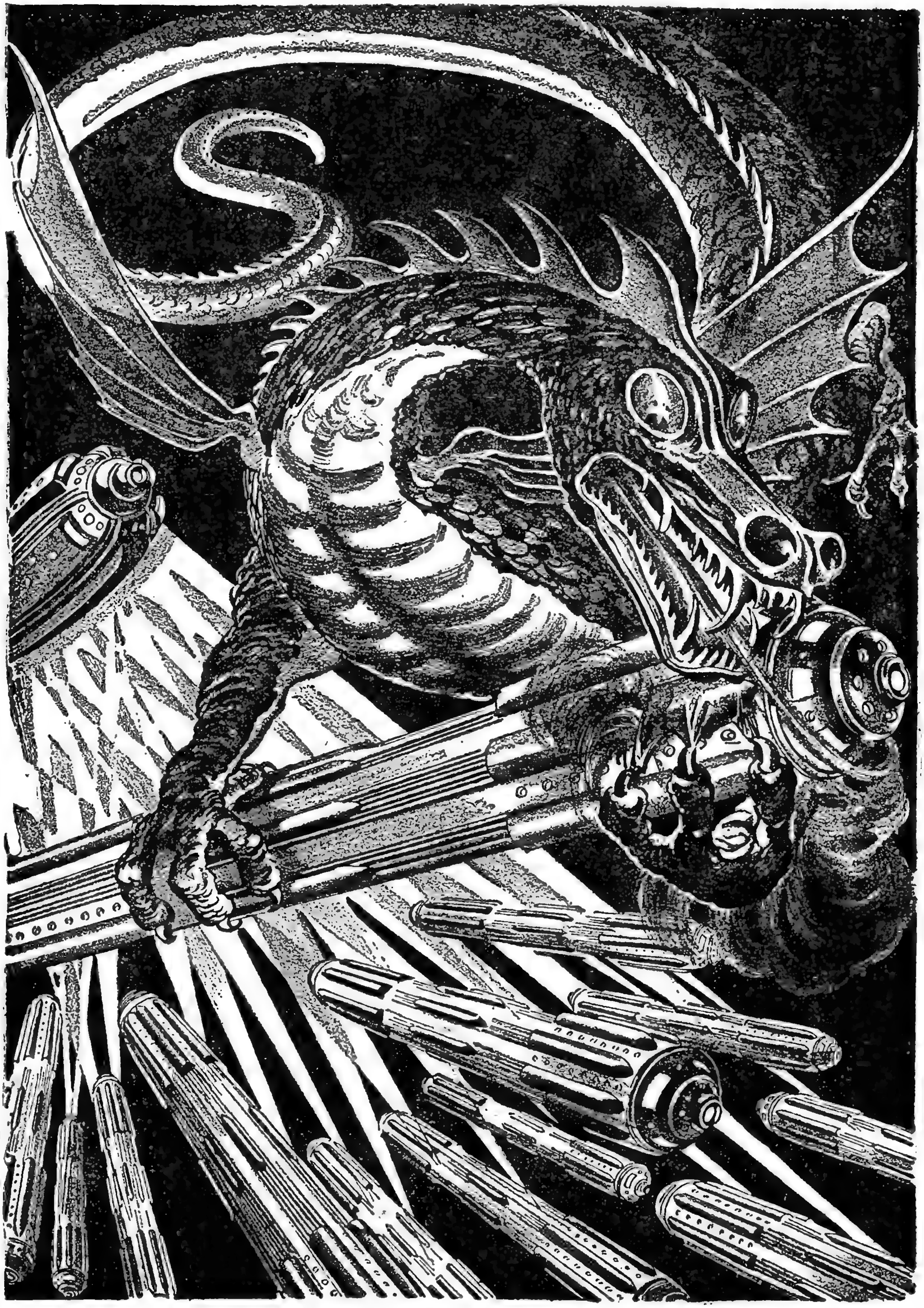
So swiftly that they were almost invisible, a number of artificial matter tools were at work. The cosmium was rapidly pinched off, and smoothed against the pitted wall of the ship, till it was smooth once more, and as brightly shiny as before.

"We are ready now. I have just received a message from Zezdon Fentes that he has an important communication to make, so I will go down to New York instead of to Chicago, if you gentlemen do not mind. Morey will take you to Chicago in the tender, and I can find Zezdon Fentes."

Zezdon Fentes' message was brief. He had discovered from the minds of several who had been killed by the magnetic field Arcot had used, and not destroyed, that they had a base in this universe. Thett's base was somewhere near the center of the galaxy, on a system of unusually large planets, circling a rather small star. But what star their minds had not revealed.

"It's up to us then to locate said star," said Arcot, after listening to Zezdon Fentes' account: "I think the easiest way will be to follow them home. We can go to your world, Zezdon Fentes, and see what they are doing there, and drive them off. Then to yours, Stel Felso. I place your world second as it is far better able to defend itself than is Ortol. It is agreeable?"

It was, and the ship, which had been hanging in the atmosphere over New York, where Zezdon Afthen Fentes and Inthel had come to it in a taxi-ship, signalled for the crowd to clear away above. The enormous bulk of the shining machine, the savior of Earth, had attracted a very great amount of attention, naturally, and thousands on thousands of hardy souls had braved the cold of the fifteen mile height with altitude suits or in small ships to climb up. Now they cleared



Faster than the mighty space ship, the awful Thing caught it in mighty talons that ripped through solid relux.

away, and as the ship slowly rose, the tremendous concentrated mental well-wishing of the thousands reached the men within the ship. "That," observed Morley, "is one thing cosmium won't stop. In some ways I wish it would—because the mental power that could be wielded by any great number of those highly advanced Thessians, if they know its possibilities, is not a thing to neglect."

"I can answer that, Terrestrian," thought Zezdon Afthen. "Our instruments show great mental powers, and great ability to concentrate the will in mental processes, but they indicate a very slight development of these abilities. Our race, despite the fact that our mental powers are much less than those of such men as Arcot and yourself, have done, and can do many things your greater minds cannot, for we have learned the direction of the will. We need not fear the will of the Thessians. I feel confident of that!"

The ship was in space now, and as Arcot directed it toward Ortol, far far across the Island, he threw on, for the moment, the combined power of space distortion and time fields. Instantly the sun vanished, and when, less than a second later, he cut off the space field, and left only the time, the constellations were instantly recognizable. They were within a dozen light years of Ortol.

"Morey, may I ask what you call this machine?" asked Torlos.

"You may, but I can't answer," laughed Morey. "We were so anxious to get it going that we didn't name it. Any suggestions?"

For a moment none of them made any suggestions, then slowly came Arcot's thoughts, clear and sharp, the thoughts of carefully weighed decision.

"The swiftest thing that ever was *thought!* The most irresistible thing, *thought,* for nothing can stop its progress. The most destructive thing, *thought.* Thought, the greatest constructor, the greatest destroyer, the product of mind, and producer of powers, the greatest of powers. Thought is controlled by the mind. Let us call it *Thought!*"

"Excellent, Arcot, excellent. The *Thought,* the controller of the powers of the cosmos!" cried Morey.

"But the *Thought* has not been christened, save in battle, and then it had no name. Let us emblazen its name on it now," suggested Wade.

STOPPING their motion through space, but maintaining a time field that permitted them to work without consuming previous time, Arcot formed some more cosmium, but now he subjected it to a special type of converter field, and into the cosmium, he forced some light photons, half bound, half free. The fixture he formed into the letters, and welded forever on the gigantic prow of the ship, and on its huge sides. *Thought,* it stood in letters ten feet high, made of clear transparent cosmium, and the golden light photons, imprisoned in it, the slowly disintegrating lux metal, would cause those letters to shine for countless aeons with the steady golden light they now had.

The *Thought* continued on now, and as they slowed their progress for Ortol, they saw that messengers of Thett had barely arrived. The fort here too had been razed to the ground, and now they were concentrating over the largest city of Ortol. Their rays were beating down on the great ray screen that terrestrial engineers had set up, protecting the city, as Earth had been protected. But the fleet that stood guard was small, and was rapidly being destroyed. A fort broke free, and plunged at last for the ray screen. Its relux walls glowed a thousand colors as the tremendous energy of the ray-screen struck them—but it was through!

A molecular ray reached down for the city—and stopped half way in a tremendous corruscating burst of light and energy. Yet there was none of the sheen of the ray screen. Merely light.

The fort was still driving downward. Then suddenly it stopped, and the side dented in like the side of a can some one has stepped on, and it came to sudden rest against an invisible, impenetrable barrier. A molecular reached down from somewhere in space, hit the ray screen of Ortol, which the Thessians had attacked for hours, and the screen flashed into sudden brilliance, and disappeared. The ray struck the Thessian fort, and the fort burst into tremendous opalescence, while the invisible barrier the ray had struck was suddenly a great sheet of flaming light. In less than half a second the opalescence was gone, the fort shuddered, and shrieked out of the planet's atmosphere, a mass of lux now, and susceptible to the moleculars. And everything that lived within that fort had died instantly and painlessly.

The fleet which had been preparing to follow the leading fort was suddenly stopped; it halted indecisively.

Then the *Thought* became visible as its great golden letters showed suddenly, streaking up from distant space. Every ship turned cosmics and moleculars on it. The cosmics rebounded from the cosmium walls, and from the artificial matter that protected the eyes. The moleculars did not affect either, but the invisible protective sheet that the *Thought* was maintaining in the Ortolian atmosphere became misty as it fought the slight molecular rebounds.

The *Thought* went into action. The fort which remained was the point of attack. The fort had turned its destructive ray on the cosmium ship with the result that, as before, the cosmium slowly disintegrated into puffs of cosmic rays. The vapor seemed to boil out, puff suddenly, then was gone. Arcot put up a wall of artificial matter to test the effect. The ray went right through the matter, without so much as affecting it. He tried a sheet of pure energy, an electro-magnetic energy stream of tremendous power. The ray bent sharply to one side. But in a moment the Thessians had realigned it.

"It's a photonic stream, but of some type that doesn't affect ordinary matter, but only artificial matter, such as lux, relux, or cosmium. As I can't make those with artificial matter apparatus, except to make real material, I can't get it to fight. If the artificial matter would only fight it, I'd be all right." The thought running through Arcot's mind reached the others.

A tremendous burst of light energy to the rear announced the fact that a Thessian had crashed against the artificial matter wall that surrounded the ship. Arcot was throwing the Thessian destructive beam from side to side now, and twice succeeded in misdirecting it so that it hit the enemy machines.

The *Thought* sent out its terrific beam of magnetic energy. The ray was suddenly killed, and the fort cruised helplessly on. Its driving apparatus was dead. The diffused cosmics reached out, and as the magnetic field, the relux and the cosmics interacted, the great fort was suddenly blue-white—then instantly a dust that scattered before an enormous blast of air.

From the *Thought* a great shell of artificial matter went, a visible, misty wall, that curled forward, and wrapped itself around the Thessian ships with a motion of tremendous speed, yet deceptive, for it seemed to billow and flow.

A Thessian warship decided to brush it away—and plowed into inconceivable strength. The ship crumpled to a mass of broken relux.

The greater part of the Thessian fleet had already fled, but there remained half a hundred great battleships. And now, within half a million miles of the planet, there began a battle so weird that astronomers who watched could not believe it.

From behind the *Thought*, where it hung motionless beyond the misty wall, a Thing came.

THE Thessian ships had realized now that the misty sphere that walled them in was impenetrable, and their rays were off, for none they now had would penetrate it. The forts were gone.

But the Thing that came behind the *Thought* was a ship, a little ship of the same misty white, and it flowed into, and through the wall, and was within their prison. The Thessian ships turned their rays toward it, and waited. What was this thing?

The ovaloid ship which drifted so slowly toward them suddenly seemed to jerk, and from it reached pseudopods! An amoeba on a titanic scale! It writhed its way purposefully toward the nearest ship, and while that ship waited, a pseudopod reached out, and suddenly drove through the four foot relux armor! A second pseudopod followed with lightning rapidity, and in an instant the ship had been split from end to end!

Now a hundred rays were leaping toward the thing, and the rays burst into fire and gouts of light, blackened, burned pseudopods seemed to fall from the thing and hastily it retreated from the enclosure, flowing once more through the wall that stopped their rays.

But another Thing came. It was enormous, a mile long, a great, shining scaly thing, a dragon, and on its mighty neck was mounted an enormous, distorted head, with great flat nose and huge flapping nostrils. It was a Thessian head! The mouth, fifty feet across, wrinkled into an horrific grin, and broken, stained teeth of iron showed in the mouth. Great talons upraised, it rent the misty wall that bound them, and writhed its awful length in. The swish of its scales seemed to come to the watchers, as it chased after a great battleship whose pilot fled in terror. Faster than the mighty space ship the awful Thing caught it in mighty talons that ripped through solid relux. Scratching, fluttering enormous, blood-red wings, the silvery claws tore away great mases of relux, sending them flying into space.

Again rays struck at it. Cosmic and moleculars with blinding pencils of light. For now in the close space of the Wall was an atmosphere, the air of two great warships, and though the space was great, the air in the ships was dense.

The rays struck its awful face. The face burst into light, and smoke, black, greasy smoke streamed up, as the thing writhed and twisted horribly, awful screams rang out. Then it was free, and half the face was burned away, and a grinning, bleeding, half-cooked face writhed and screamed in anger at them. It darted at the nearest ship, and ripped out that ray that burned it—and quivered into death. It quivered, then quickly faded into mist, a haze, and was gone!

A last awful thing—a thing they had not noticed as all eyes watched that Thing—was standing by the rent in the Sphere now, the gigantic Thessian, with leering, bestial jaws, enormous, squat limbs, the webbed fingers and toes, and the heavy torso of his race, grinning at them. In one hand was a thing—and his jaws munched. Thett's men stared in horror as they recognized that thing in his hand—a Thessian body! He grinned happily and reached for a battleship—a ray burned him. He howled, and leaped into their midst.

Then the Thessians went mad. All fought, and they fought each other, rays, of all sorts, their moleculars and their cosmics, while in their midst the Giant howled his glee, and laughed and laughed—

Eventually it was over, and the last limping Thessian ship drove itself crazily against the wreck of its last enemy. And only wreckage was left.

"Lord, Arcot! Why in the Universe did you do that —and how did you conceive those horrors?" asked Morey, more than a little amazed at the tactics Arcot had displayed.

Arcot shook himself, and disconnected his controls. "Why—why I don't know. I don't know what made me do that I'm sure. I never imagined anything like that dragon thing—how did—"

His keen eyes fixed themselves suddenly on Zezdon Fentes, and their tremendous hypnotic power beat down the resistance of the Ortolian's trained mind. Arcot's mind opened for the others the thoughts of Zezdon Fentes.

He had acted as a medium between the minds of the Thessians, and Arcot. Taking the horror-ideas of the Thessians, he had imprinted them on Arcot's mind while Arcot was at work with the controls. In Arcot's mind, they had acted exactly as had the ideas that night on Earth, only here the demonstration had been carried to the limit, and the horror ideas were compounded to the utmost. The Thessians, highly developed minds though they were, were not resistant and they had broken. The Allies, with their different horror-ideas, had been but slightly affected.

"We will leave you on Ortol, Zezdon Fentes. We know you have done much, and perhaps your own mind has given a bit. We hope you recover. I think you agree with me, Zezdon Afthen and Inthel?" thought Arcot.

"We do, heartily, and are heartily sorry that one of our race has acted in this way. Let us proceed to Talso, as soon as possible. You might send Fentes down in a shell of artificial matter," suggested Zezdon Afthen.

"Which," said Arcot, after this had been done, and they were on their way to Talso, "shows the danger of a mad *Thought!*"

CHAPTER XXI

The Power of the *Thought*

BUT it seemed, or must have seemed to any infinite being capable of watching it as it moved now, that the *Thought* was a mad thought. With the time control opened to the limit, and a touch of the space control, it fled across the Universe at a velocity such as no other thing was capable of.

Stars wheeled, and fled behind it as mountains wheel, and flee behind a racing space ship as it enters a world's atmosphere. Stars, light years apart, or hundreds of light years apart, flashed to discs, wheeled, winked, and changed color under the action of the space control, winked from green to violet discs, and fled back to insignificance with a speed that seemed phantasmal.

One star—it flashed to a disc, loomed enormous—overpowering — then suddenly they were flashing *through* it! The enormous coils fed their current into the space-coils and the time field, and the ship seemed to twist and writhe in distorted space as the gravitational field of a giant star, and a giant ship's space field fought for a fraction of time so short as to be utterly below measurement. Then the ship was gone—and behind it a star, the center of which had suddenly been hurled into another space forever, as the counteracting, gravitational field of the outer layers was removed for a moment, and only its own enormous density affected space, writhed and collapsed upon itself, to explode into a mighty sea of flames. Planets it formed, we know, by a process such as can happen when only this man-made accident happens.

But the ship fled on, its great coils partly discharged, but still far more charged than need be.

It was minutes to Talso where it had been hours with the *Ancient Mariner*, but now they traveled with the speed of the *Thought!*

Talso too was the scene of a battle, and more of a battle than Ortol had been, for here where more powerful defensive forces had been active, the Thessians had been more vengeful. All their remaining ships seemed concentrated here. And the great molecular screen that terrestrian engineers had flung up here had already fallen. Great holes had opened in it, as two great forts, and a thousand ships, some mighty battleships of the intergalactic spaces, some little scout cruisers, had turned their rays on the struggling defensive machines. It had held for hours, thanks to the tremendous tubes that Talso had had in their power-distribution stations, but in the end had fallen, but not before many of their largest cities had been similarly defended, and the people of the others had scattered broadcast.

True, wherever they might be, a diffused molecular would find them and destroy all life save under the few screens, but if the Thessians once diffused their rays, without entering the atmosphere, the broken screen would once more be able to hold.

No fleet had kept the Thessian forces out of this atmosphere, but dozens of more adequately powered artificial matter bomb stations had taught Thett respect for Talso. But Talso's own ray screen had stopped their bombs. They could only send their bombs as high as the screen. They did not have Arcot's tremendous control power to maintain the matter without difficulty even beyond a screen.

At last the screen had fallen, and the Thessian ships, a hole once made, were able to move, and kept that hole always under them, though if it once were closed, they would again have the struggle to open it.

Exploding matter bombs had twice caused such spatial strains and ionized conditions as to come near closing it, but finally the Thessian fleet had arranged a ring of ships about the hole, and opened a cylinder of rays that reached down to the planet.

Like some gigantic plow the rays tore up mountains, oceans, glaciers and land. Tremendous chasms opened in straight lines as it plowed along. Unprotected cities flashed into fountains of rock and soil and steel that leaped upwards as the rays touched, and were gone. Protected cities, their screens blazing briefly under the enormous ray concentration as the ships moved on, unheeding, stood safe on islands of safety amidst the destruction. Here in the lower air, where ions would be so plentiful, Thett did not try to break down the screens, for the air would aid the defenders.

Finally, as Thett's forces had planned, they came to one of the ionized layer ray-screen stations that was still projecting its cone of protective screening to the layer above. Every available ray was turned on that station, and, designed as it was for protecting part of a world, the station was itself protected, but slowly, slowly as its already heated tubes weakened their electronic emission, the disc of ions retreated more and more toward the station as, like some splashing stream, the Thessian rays played upon it forcing it back. A rapidly accelerating retreat, faster and faster, as the disc changed from the dull red of normal defense to the higher and bluer quanta of failing, less complete defense, the disc of interference retreated.

Then, with a flash of light, and a roar as the soil below spouted up, the station was gone. It had failed.

Instantly the ring of ships expanded as the great screen was weakened by the withdrawal of this support. Wider was the path of destruction now as the forces moved on.

But high, high in the sky, far out of sight of the naked eye, was a tiny spot that was in reality a giant ship. It was flashing forward, and in moments it was visible. Then, as another deserted city vanished, it was above the Thessian fleet.

Their rays were directed downward through a hole that was even larger. A second station had gone with that city. But, as by magic, the hole closed up, and chopped their rays off with a decisiveness that startled them. The interference was so sharp now that not even the dullest of reds showed where their beams touched. The close interference was giving off only radio! In amazement they looked for this new station of such enormous power that their combined rays did not noticeably affect it. A world had been fighting their rays unsuccessfully. What single station could do this, if the many stations of the world could not? There was but one they knew of, and they turned now to search for the ship they knew must be there.

"No horrors this time; just clean, burning energy," muttered Arcot.

It was clean, and it was burning. In an instant one of the forts was a mass of opalescence that shifted so swiftly it was purest white, then rocketed away, lifeless, and no longer relux.

The other fort had its screen up, though its power, designed to withstand the attack of a fleet of enormous intergalactic, matter-driven, fighting ships lasted but an instant under the driving power of half a million million suns, concentrated in one enormous ray of energy. The sheer energy of the ray itself, molecular ray though it was, heated the material it struck to blinding incandescence even as it hurled it at a velocity close to that of light into outer space. With little sparkling flashes battleships of the void after giant cruisers flashed into lux, and vanished under the ray.

A tremendous combined ray of magnetism and cosmic ray energy replaced the molecular, and the ships exploded into a dust as fine as the primeval gas from which came all matter.

Sweeping energy, so enormous that the defenses of the ships did not even operate against it, shattered ship after ship, till the few that remained turned, and, faster than the pursuing energies could race through space, faster than light, headed for their base.

"That was fair fight; energy against energy," said Arcot delightedly, for his new toy, which made playthings of suns and fed on the cosmic energy of a universe, was behaving nicely, "and as I said Stel Felso Theu, at the beginning of this war the greater Power wins, always. And in our Island here, I have five hundred thousand million separate power plants, each generating at the rate of decillions of ergs a second, backing this ship.

"Your world will be safe now, and we will head for our last embattled ally, Sirius." The titanic ship turned, and disappeared from the view of the madly rejoicing billions of Talso below, as it sped, far faster than light, across a universe to relieve another sorely tried civilization.

Knowing their cause was lost, hopeless in the knowledge that nothing known to them could battle that enormous force concentrated in one ship, the *Thought*, the Thessians had but one aim now, to do all the damage in their power before leaving.

Already their tremendous, unarmed and unarmored transports were departing with their hundreds of thousands from that base system for the far-off Island of Space from which they had come. Their battlefleets were engaged in destroying all the cities of the allies, and those other helpless races of our system that they could. Those other inhabited worlds, many of which were completely wiped out because Arcot had no knowledge of them, were relieved only when the general call for retreat to protect the mother planet was sent out.

But Sirius was looming enormous before them. And its planets, heavily defended now by the combined Sirian terrestrial and Venerian fleets and great ray screens as well as a few matter-bomb stations were suffering losses none the less. For the old Sixth of Negra, the Third here, had fallen. Slipping in on the night side of the planet, all power off, and so sending forth no warning impulses till it actually fell through the ray screen, a small fleet of scouts had entered. Falling still under simple gravity, they had been missed by the rays till they had fallen to so small a distance, that no humans or men of our allied systems could have stopped, but only their enormous iron boned strength permitted them to resist the acceleration they used to avert collision with the planet. Then scattering swiftly, they had blasted the great protective screen stations by attacking on the sides, where the ray screen projectors were not mounted. Designed to protect above, they had no side armor. And the Sixth was opened to attack.

Two and one-half billion people lost their lives painlessly and instantaneously as tremendous diffused moleculars played on the revolving planet.

Arcot arrived soon after this catastrophe. The Thessians left almost immediately, after the loss of three hundred or more ships. One hundred and fifty wrecks were found. The rest were so blasted by the forces which attacked them, that no traces could be found, and no count made.

But as those ships fled back to their base, Arcot, with the wonderfully delicate mental control of his ship was able to watch them, and follow them, for, invisible under normal conditions, by twisting space in the same manner that they did he was able to see them flee, and follow.

Light year after light year they raced toward the distant base. They reached it in two hours, and Arcot saw them from a distance sink to the various worlds. There were twelve gigantic worlds, each far larger than Jupiter of Sol, and larger than Stwall of Talso's sun, Renl.

"I think," said Arcot as he stopped the ship at a third of a light year, "that we had best destroy those planets. We may kill many men, and innocent noncombatants, but they have killed many of our races, and it is necessary. There are, no doubt, other worlds of this Universe here that we do not know of that have felt the vengeance of Thett, and if we can cause such trouble to them by destroying these worlds, and putting the fear of our attacking their mother world into them, they will call off those other fleets. I could have been invisible to Thett's ships as we followed them here, and for the greater part of the way I was, for I was sufficiently out of their time-rate, so that they were visible only by the short ultra-violet, which would have put us in their infra-red, and no photoelectric cell will work on quanta of such low energy. When at last I was sure of the sun for which they were heading, I let them see us, and they know we are aware of their base, and that we can follow them.

"I will destroy one of these worlds, and follow a fleet as it starts for their home nebula. Gradually, as they run, I will fade into invisibility, and they will not know that I have dropped back here to complete the work, but will think I am still following. Probably they will run to some other nebula in an effort to throw me off, but they will most certainly send back a ship to call the fleets here to the defense of Thett.

"I think that is the best plan. Do you agree?"

"Arcot," asked Morey slowly, "if this race attempts to settle another Universe, what would that indicate of their own?"

"Hmmm—that it was either entirely populated by their own race or that another race held the parts they did not, and that the other race was stronger," replied Arcot. "The thought idea in their minds has always been a single world, single solar system as their home, however."

"And single solar systems cannot originate in this Space," replied Morey, referring to the fact that in the primeval gas from which all matter in this Universe and all others came, no condensation of mass less than thousands of millions of times that of a sun could form and continue.

"We can only investigate—and hope that they do not inhabit the whole system, for I am determined that, unpleasant as the idea may be, there is one race that we cannot afford to have visiting us, and it is going to be permanently restrained in one way or another. I will first have a conference with their leaders and if they will not be peaceful—the *Thought* can destroy or make a Universe! But I think that a second race holds part of that Universe, for several times we have read in their minds the thought of the 'Mighty Warless Ones of Venone'."

"And how do you plan to destroy so large a planet as these are?" asked Morey, indicating the telectroscope screen.

"Watch and see!" said Arcot.

They shot suddenly toward the distant sun, and as it expanded, planets came into view. Moving ever slower on the time control, Arcot drove the ship toward a gigantic planet at a distance of approximately 300,000,000 miles from its primary, the sun of this system.

Arcot fell into step with the planet as it moved about in its orbit, and watched the speed indicator carefully.

"What's the orbital speed, Morey?" asked Arcot.

"About twelve and a half miles per second," replied the somewhat mystified Morey.

"Excellent, my dear Watson," replied Arcot. "And now does my dear friend know the average molecular velocity of ordinary air?"

"Why, about one-third of a mile a second, average."

"And if that planet as a whole should stop moving, and the individual molecules be given the entire energy, what would their average velocity be? And what temperature would that represent?" asked Arcot.

"Good—Why, they would have to have the same kinetic energy as individuals as they now have as a whole, and that would be an average molecular velocity in random motion of 12.5 miles a second—giving about —about—about—twelve thousand degrees centigrade!" exclaimed Morey in surprise. "That would put it in the far blue-white region!"

"Perfect. Now watch." Arcot donned the headpiece he had removed, and once more took charge. He was very far from the planet, as distances go, and they could not see his ship. But he wanted to be seen. So he moved closer, and hung off to the sunward side of the planet, then moved to the night side, but stayed in the light. In seconds, a battlefleet was out attempting to destroy him.

Surrounding the ship with a wall of artificial matter, lest they annoy him, he set to work.

Directly in the orbit of the planet, a faint mistiness appeared, and rapidly solidified to a titanic cup, directly in the path of the planet.

Arcot was pouring energy into the making of that matter at such a rate that space was twisted now about them. The meter before them, which had not registered previously, was registering now, and had moved over to three. Three sols—and was still climbing. It stopped when ten were reached. Ten times the energy of our sun was pouring into that condensation, and it solidified quickly.

The Thessians had seen the danger now. It was less than ten minutes away from their planet, and now great numbers of ships of all sorts started up from the planet, swarming out like rats from a sinking vessel.

Majestically the great world moved on in its orbit toward the thin, thin wall of infinite strength and infinite toughness. Already Thessian battleships were tearing at that wall with rays of all types, and the wall sputtered back little gouts of light, and remained. The meters on the *Thought* were no longer registering. The wall was built, and now Arcot had all the giant power of the ship holding it there. Any attempt to move it or destroy it, and all the energy of the Universe would rush to its defense!

The atmosphere of the planet reached the wall. Instantly, as the pressure of that enormous mass of air touched it, the wall fought, and burst into a blaze of energy. It was fighting now, and the meter that measured sun-powers ran steadily, swiftly up the scale. But the men were not watching the meter; they were watching the awesome sight of Man stopping a world in its course! Turning a world from its path!

But the meter climbed suddenly, and the world was suddenly a tremendous blaze of light. The solid rock had struck the giant cup, 110,000 miles in diameter. It was silent, as a world pitted its enormous kinetic energy against the combined forces of a universe. Soundless—and as hopeless. Its strength was nothing, its energy pitted unnoticed against the energy of five hundred thousand million suns—as vain as those futile attempts of the Thessian battleships on the invulnerable walls of the *Thought.*

What use is there to attempt description of that scene as 2,500,000,000,000,000,000,000,000 tons of rock and metal and matter crashed against a wall of energy, immovable and inconceivable. The planet crumpled, and split wide. A thousand pieces, and suddenly there was a further mistiness about it, and the whole enormous mass, seeming but a toy, as it was from this distance in space, and as it was in this ship, was enclosed in that same, immovable, unalterable wall of energy.

The ship was as quiet and noiseless, as without indication of strain as when it hummed its way through empty space. But the planet crumpled and twirled, and great seas of energy flashed about it.

The world, seeming tiny, was dashed helpless against a wall that stopped it, but the wall flared into equal and opposite energy, so that matter was raised not to the twelve thousand Morey had estimated, but nearer twenty-four thousand degrees. It was over in less than half an hour, and a broken, mis-shapen mass of blue incandescence floated in space. It would fall now, toward the sun, and it would, because it was motionless and the sun moved, take an eccentric orbit about that sun. Eventually, perhaps, it would wipe out the four inferior planets, or perhaps it would be broken as it came within the Roches limit of that sun. But the planet was now a miniature sun, and not so very small, at that.

And from every planet of the system was pouring an assorted stream of ships, great and small, and they all set panic-stricken across the void in the same direction. They had seen the power of the *Thought,* and did not contest any longer its right to this system.

CHAPTER XXII

Thett

THROUGH the utter void of intergalactic space sped a tiny shell, a wee mite of a ship. Scarcely twenty feet long, it was one single power plant. The man who sat alone in it, as it tore through the void at the maximum speed that even its tiny mass was capable of, when every last twist possible had been given to the distorted time fields, watched a far, far galaxy ahead that seemed unchanging.

Hours, days sped by, and he did not move from his position in the ship. But the ship had crossed the great gulf, and was speeding through the galaxy now. He was near the end. At a reckless speed, he sat motionless before the controls, save for slight movements of supple fingers that directed the ship at a mad pace about some gigantic sun and its family of planets. Suns flashed, grew to discs, and were left behind in the briefest instant.

The ship slowed, the terrific pace it had been holding fell, and dull whine of overworked generators fell to a contented hum. A star was looming, expanding before it. The great sun glowed the characteristic red of a giant as the ship slowed to less than a light-speed, and turned toward a gigantic planet that circled the red sun. The planet was very close to 500,000 miles in diameter, and it revolved at a distance of four and one-half billions of miles from the surface of its sun, which made the distance to the center of the titanic primary four billion, eight hundred million miles, in round figures, for the sun's diameter was close to six hundred and fifty million miles! Greater even than Antares, whose diameter is close to four hundred million miles, was this star of another universe, and even from the billions of miles of distance that its planet revolved, the disc was enormous, a titanic disc of dull red flame. But so low was its surface temperature, that even that enormous disc did not overheat the giant planet.

The planet's atmosphere stretched out tens of thousands of miles into space, and under the enormous gravitational acceleration of the tremendous mass of that planet, it was near the surface a blanket dense as water. There was no temperature change upon it, though its night was one hundred hours long, and its day the same. The centrifugal force of the rapid rotation of this enormous body had flattened it when still liquid till it seemed now more of the shape of a pumpkin than of an orange. It was really a double planet, for its satellite was a world of one hundred thousand miles diameter, yet smaller in comparison to its giant primary than is Luna in comparison to Earth. It revolved at a distance of five million miles from its primary's center, and it, too, was swarming with its people.

But the racing ship sped directly toward the great planet, and shrieked its way down through the atmosphere, till its outer shell was radiating far in the violet.

Straight it flew to where a gigantic city sprawled in heaped, somber masonry, but in some order yet, for on closer inspection the appearance of interlaced circles came over the edge of the giant cities. Ray screens were circular and the city was protected by dozens of stations.

The scout was going well under the speed of light now, and a message, imperative and commanding, sped ahead of him. Half a dozen patrol boats flashed up, and fell in beside him, and with him raced to a gigantic building that reared its somber head from the center of the city.

Under a white sky they proceeded to it, and landed on its roof. From the little machine the single man came out. Using the webbed hands and feet that had led the Allied scientists to think them an aquatic race, he swam upward, and through the water-dense atmosphere of the planet toward the door.

Trees overtopped the building, for it had but four stories, above ground, though it was the tallest in the city. The trees, like seaweed, floated most of their enormous weight in the dense air, but the buildings under the gravitational acceleration, which was more than one hundred times Earth's gravity, could not be built very high ere they crumple under their own weight. Though one of these men weighed approximately two hundred pounds on Earth, for all their short stature, on this planet their weight was more than ten tons! Only the enormously dense atmosphere permitted them to move.

And such an atmosphere! At a temperature of almost exactly 360 degrees centigrade, there was no liquid water on the planet, naturally. At that temperature water cannot be a liquid, no matter what the pressure, and it was a gas. In their own bodies there was liquid water, but only because they lived on heat, their muscles absorbed their energy for work from the heat of the air. They carried in their own muscles refrigeration, and, with that aid, were able to keep liquid water for their life processes. With death, the water evaporated. Almost the entire atmosphere was made up of oxygen, with but a trace of nitrogen, and some amount of carbon dioxide.

Here their enormous strength was not needed, as Arcot had supposed, to move their own bodies, but to enable them to perform the ordinary tasks of life. The mere act of lifting a thing weighing perhaps ten pounds on Earth, here required a lifting force of more than half a ton! No wonder enormous strength had been developed! Such things as a man might carry with him, perhaps a ray pistol, would weigh half a ton; his money would weigh near to a hundred pounds!

But—there were no guns on this world. A man could throw a stone perhaps a short distance, but when a gravitational acceleration of more than half a mile per second acted on it, and it was hurled through an atmosphere dense as water—what chance was there for a long range?

But these little men of enormous strength did not know other schemes of existence, save in the abstract, and as things of comical peculiarity. To them life on a planet like Earth was as life to a terrestrian on a planetoid such as Ceres, Juno or Eros would have seemed. Even on Thettsost, the satellite planet of Thett, life was strange, and they used lux roofs over their cities, though their weight there was four tons!

As the scout swam through the dense atmosphere of his world toward the entrance way to the building, guards stopped him, and examined his credentials. Then he was led through long halls, and down a shaft ten stories below the planet's surface, to where a great table occupied a part of a low ceiled, wide room. This room was shielded, interference screens of all known kinds lined the hollow walls, no rays could reach through it to the men within. The guard changed, and new men examined the scout's credentials, and he was led still deeper into the bowels of the planet. Once more the guard changed, and he entered a room guarded not by single shields but by triple, and walled with six foot relux, and ceiled with the same strong material. But here, under the enormous gravity, even its great strength required aid in the form of pillars.

A GIANT of his race sat before a low table. The table ran half the length of the room, and beside it sat four other men. But there were places for more than two dozen.

"A scout from the colony? What news?" demanded the leader. His voice was a growl, deep and throaty.

"Oh mighty Sthanto (chief slayer of men), I bring news of resistance. We waited too long, in our explorations, and those men of World 3769-8482730-3 have learned too much. We were wrong. They had found the secret of exceeding the speed of light, and can travel through space fully as rapidly as we can, and now, since by some means we cannot fathom, they have learned to combine both our own system and theirs, they have one enormous engine of destruction that travels across their huge universe in less time than it takes us to travel across a planetary system," said the scout, speaking rapidly.

"Our cause is lost, which is by far the least of our troubles. Thett is in danger. We cannot hope to combat that ship. It is, in length, approximately three and one-quarter talt, in diameter one-half talt. It is made of a material which seems to be relux. It turns cosmics and light and lower frequencies, as does relux, but more, it does not yield either to the double ray nor to the molecular ray. The twin ray merely causes it to boil away slowly, and that boiling releases its energy slowly, and from examinations of that energy release we learn it is crystallized cosmic rays, a thing we have long known to be capable of formation, but under conditions unattainable."

"Thalt—what means have we. Can we not better them?" demanded Sthanto of his chief scientist.

"Great Sthanto, we know that such a substance can be made when pressure can be brought to bear on cosmic rays under the influence of field 24-7649-321, but that field cannot be produced, and could not be produced, only crystallized cosmic rays could exist within it, thus no pressure could be brought to bear upon the rays to crystallize them in the first place. We cannot produce that field because no sufficient concentration of energy is available. Energy cannot be released rapidly enough to replace the losses when the field is developing. The fact that they have that material indicates their possession of an unguessed and terrific energy source. I would have said that there was no energy greater than the energy of matter," replied Thalt smoothly. "But may I add that we know the properties of this material and that the triple ray which has at last been perfected, and can be produced providing your order for all energy sources is given, will release its energy at a speed comparable to the rate of energy release of relux in a twin ray, but that the release takes place only in the path of the ray."

"What more, Scout?" asked Sthanto smoothly.

"The ship first appeared in connection with our general attack on world 3769-8482730-3. The attack was near success, their screens were already failing. They have devised a new and very effective screening. They screen the entire world by using the ionized layer as a conductor. It was exceedingly difficult to break, and since their sun had been similarly screened, we could not throw masses of that matter upon them.

"In another sthan of time, we would have destroyed their world. Then the ship appeared. It has molecular rays, magnetic beams and cosmic rays, and a fourth weapon we know nothing of. It has molecular screens, we suspect, but has not had occasion to use them.

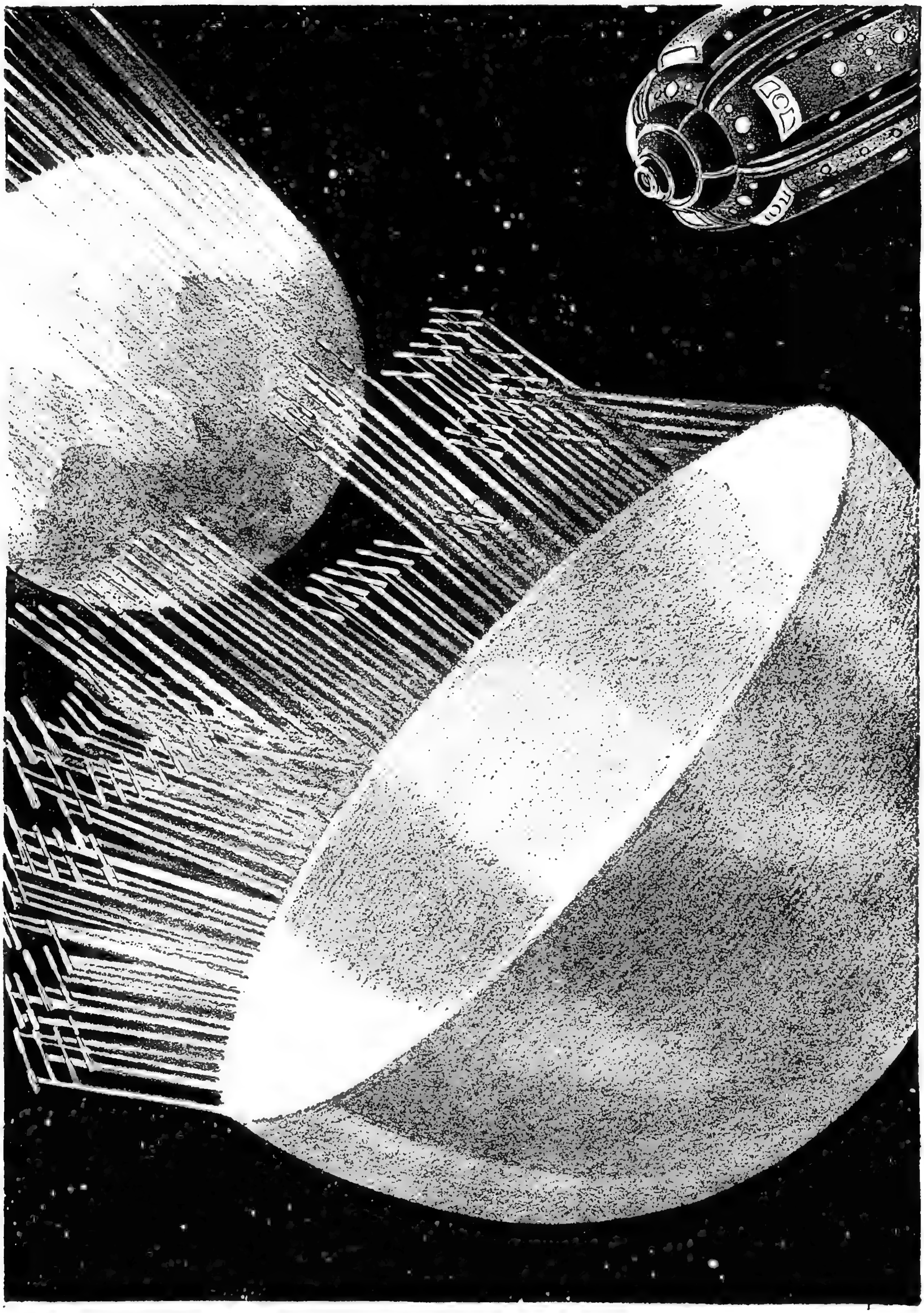
"Our heaviest molecular screens flash under their molecular rays. Ordinary screens do not even flash as they break. All screens fall instantly without momentary defense. The itotalt thick relux of the forts glows pure white, the opalescence of disintegration proceeds so rapidly. The ray power is incalculable.

"Their magnetic beams are used in conjunction with cosmics. The action of the two causes the relux to induce current, and due to reaction of currents on the magnetic field—"

"And the resistance due to the relux, the relux is first heated to incandescence and then the ship opens out as the air pressure bends the magnetically softened relux?" finished Thalt.

"No, the effect is even more terrific. It explodes into powder," replied the scout.

"And what happens to worlds that the magnetic ray touches?" inquired the scientist.



Directly in the orbit of the planet, a faint mistiness appeared, and rapidly solidified to a titanic cup . . .

"A corner of it touched the world we fought over, and the world shook," replied the colonist.

"And the last weapon?" asked Sthanto, his voice soft now.

"It seems a ghost. It is a mistiness that comes into existence like a cloud, and what it touches is crushed, what it rams is shattered. It surrounds the great ship, and machines crashing into it at a speed of more than six times that of light are completely destroyed, without in the slightest injuring the shield.

"Then—what caused my departure from the colony—it showed once more its unutterable power. The mistiness formed in the past of our colonial world, number 3769-1-5, and the planet swept against that wall of mistiness, and was shattered, and turned in less than five sthan to a ball of blue-white fire. The wall stopped the planet in its motion. We could not fight that machine, and we left the worlds. The others are coming," finished the scout.

The ruler turned his slightly smiling face to the commander of his armies, who sat beside him.

"Give orders," he said softly, almost gently, "that a triple ray station be set up under the directions of Thalt, and further notice that all power be made instantly available to it. Add that the colonists are returning defeated, and bringing danger at their heels. The triple ray will destroy each ship as it enters the system." His hand under the table pushed an invisible protuberance, and from the perfectly conducting relux floor to the equally perfectly conducting ceiling, and between four pillars grouped around the spot where the scout stood, terrific arcs suddenly came into being. They lasted for the thousandth part of a second, and when they suddenly died away, as swiftly as they had come, there was not even ash where the scout had been.

"Have you any suggestions, Thalt?" he asked of the scientist, his voice as soft as before.

"I quite agree with your conduct so far, but the future conduct you had planned is quite unsatisfactory," replied the scientist. The ruler sat motionless in his great seat, staring fixedly at the scientist. "I think it is time I take your place, therefore." The place where the ruler had been was suddenly seen as through a dark cloud, then the cloud was gone, and with it the king, only his relux chair, and the bits of lux or relux that had been about his garments remained.

"He was a fool," said the scientist softly, as he rose, "to plan on removing his scientist. Are there any who object to my succession?"

"No one objects," said Faslar, the ex-king's Prime Minister and counseller.

"Then I think, Phantal, Commander of planetary forces, that you had best see Ranstud, my assistant, and follow out the plan outlined by my predecessor. And you, Tastal, Commander of Fleets, had best bring your fleets near the planets for protection. Go."

"May I suggest, mighty Thalt," said Faslar after the others had left, "that my knowledge will be exceedingly useful to you. You have two commanders, neither of whom loves you, and neither of whom is highly capable. The family of Thadstil would be glad to learn who removed that honored gentleman, and the family of Datstir would gladly support him who brought the remover of their head to them.

"This would remove two unwelcome menaces, and open places for such as Ranstud and your son Warrtil.

"And," he said hastily as he saw a slight shift in Thalt's eyes, "I might say further that the bereaved ones of Parthel would find great interest in certain of my papers, which are only protected by my personal, constant watchfulness."

"Ah, so? And what of Kelston Faln, Faslar?" smiled the new Sthanta.

Thalt's hand relaxed. and they started a conversation and discussion on means of defense.

CHAPTER XXIII

Dreams

ARCOT, carrying out his plan, had followed the escaping colonists as they headed across the universe, following them out, and into intergalactic space, invisible to them now, but watching carefully their line of flight. Their slower ships took hours to get beyond the confines of the Island, then, with all their power on at full, they raced for Thett, far off across the void.

For several hours more Arcot followed them, lining their flight carefully, without letting them know he was following. Then, assured that he had located their home universe, he let his ship slowly sink into their visible range. Instantly the change was apparent. The great fleet of ships was suddenly wildly changing its order, as battleships fell to the rear, and passenger transports moved up. Then their line of march altered slightly, and they were headed for quite another Island.

Arcot shot one cone of moleculars at the battleships, and watched half a dozen flash into opalescence; then he disappeared from their sight as he turned on his full time power. Quickly he swung the *Thought* about, and headed back for our Island. He gave a touch of the space power as well, and minutes later, when he shut it off, he was once more far within the Island.

In ten minutes he was again following the planets of that base system the Thessians had chosen. One after another he blasted those planets into great balls of molten rock and metal, using enormous cosmic rays, thus altering their orbits very little, though the sheer mass of the cosmic rays was sufficient to drive the planets somewhat toward the sun.

Arcot did not want to go at once to Thett. He wanted to be sure that all Thett's forces had congregated there. Then he at last would destroy them. One ship, perhaps, would be enough to bring more trouble upon them, though he felt that it would not be of great import, since it was evidently a question of time before that one ship-full would be able to be a menace to Earth once more, and in the years that must intervene—. Earth herself would be too powerful; her commerce already extending to the Universe of Nansal and Sator, to hundreds of colony worlds and allied worlds of this Island, and as expansion became desirable, there were countless other vast Universes that must of necessity be habitable in some parts. Or, if they did not desire to leave this universe, the latest determinations by actual star-drift measurement from space ships had shown that this Island alone, largest of all known, contained five hundred thousand million suns, half again as many as their previous estimates, made from Earth, had shown.

With *Thought* type ships, it would be simple now to make planets when wanted, to carve from suns masses of matter of whatever type and whatever size they desired. Cooling would be simple. A giant molecular ray would quickly cool the new-made world, and working on it with the infinite tools of artificial matter and cosmic energy, the world could be placed wherever man wanted it, carved as he saw fit, the atmosphere and temperature he could determine, and the land distribution would not be a thing of chance, but of his determining. The suns—he could pick his suns, and about them place the planets he wanted. No great cataclysm would occur on that sun, when the planets he made were carved from it, for the loss of a thousandth part of its mass, the outermost layers of its mighty bulk would not practically alter it.

Enthusiastically as he sat in the great ship he thought of that future that lay before man.

He pictured the tearing of some mighty mass of matter from just such a sun as this one, the formation, the cooling of the planet, the establishment of its orbit. In his mind's eye he seemed to see that very process now, and see before him the great barren world ready for population.

Then upon it he saw trees springing into green life, cities with their multitudinous flashing buildings rising up, their ships filling the air.

"Arcot, that is the most wonderful constructive demonstration of the enormous power of this machine I have seen, but may I ask the reason for it?" broke in Morey's voice.

Arcot started. He suddenly realized that he had *neglected to remove the control headset!* His dream existed! He started now in wonder as he looked upon the world his idle dream had created! A World as large as Earth, spinning in its orbit, a new created thing, green with life, and flashing with cities—of artificial matter. They faded now as he looked, the thought that they were not there suddenly entering his mind, but the great world remained, barren rock and rolling waters!

"Good Lord, Morey!" exclaimed Arcot, not neglecting to remove the headset now, "I was merely thinking of the things man could do in the future—and the dream came true. I thought of the making of that world—and it was made. I thought of its peopling, and it was peopled!" Arcot shuddered a little now as he realized the awful power that lay in the mere dream of him who sat before the controls of the *Thought.*

"Arcot," said Morey gravely, "it is true, for your dream has come true, as it necessarily must when you dream with that power under your control." He smiled now, a little thin smile, and added, "But don't dream that I have ceased to exist, please.

"It is a magnificent future man has—can we but destroy the men who have so besieged our worlds. Some of your thoughts were clear enough for me to catch, but many were insufficiently powerful for me to catch. Only the sensitive apparatus of the ship caught them, and put them into effect. Your slightest wish is now law, a mighty natural law that all the Universe upholds with its combined might. You must be careful in those wishes.

"That was a dream, a constructive dream, as are all dreams of the true scientist, and now, and forever more, man's dreams will be realized in full, for he can make them come true by the mere act of dreaming. Most of mankind dream of things that are great and good for the race."

TO their amazement, Wade suddenly burst out laughing uproariously. "Whoa—that reminds me of an old poem, written by an Englishman of about the beginning of the scientific era—about 1900. His name was Kipling, and he was writing about the monkeys. He said that their ideas were of the order of

'Something great, and noble and new,
Done, by merely wishing it true.'

"In honor of that bit of verse I think we should by all means change the name of this ship at once to the *Banderlog,* the name of that poem. Our first intergalactic ship was named after a poem, what more appropriate than that for this ship?" laughed Wade. "But," he added more seriously, "it is the dream of the 'Banderlog,' something great and noble and new, done by merely wishing it true. And that accomplishment in itself is indeed something great and noble and new."

They had spoken in English, and the words had more or less replaced the thought-pictures, with the result that the Ortolians and the Talsonian had been unable to follow them, but Torlos, who spoke English quite well, and understood perfectly, had followed them, and now he spoke.

"There is humor in what Wade says, in speaking of your old poet, and there is greatness in what Arcot has done in making that world. It was indeed a 'constructive dream.'

"But before man can dream further of constructive good, he must first dream of destructive good; we have enemies who must be destroyed. They have captured several of my men, Arcot, and if I know their minds at all, they will certainly wish to avenge themselves on my world as well, and we have no great *Thought* to defend us. Nor have the dozens of other inhabited globes of these systems. Let us first destroy our enemies, and relieve these worlds."

"We are doing so, Torlos," said Arcot. "We will destroy them, but now we are doing our best to relieve those other worlds. We must give the Invaders time to return in their slower ships to their own planet. Then we can attack, and destroy all at once.

"But now I think it would be wise for me to practice what I have not yet had an opportunity to use—the full possibilities of mental control." Arcot meant by this the mental impression view of the entire field, vision in all directions simultaneously and simultaneous knowledge of all operations of the ship. It was a thing he must indeed become accustomed to, for such a thing was completely foreign to human experience.

So for days they circled through the universe, Arcot or Morey or Wade taking control, with full mental impression-viewing. The sensation was utterly indescribable, as their minds were simultaneously and equally completely cognizant of the entire space about them. Human eyes cannot take in a field of view of more than a very few degrees. Of that, but a very small part is seen in detail. It is a common experience that it is impossible to look at both eyes of a person simultaneously.

It is not due to any inability on the part of the brain, but due to the eyes. No man in all history ever used even half of the thinking part of his brain. The feeling and sensation section of the brain is very incompletely used, and the great mass of the brain which is designed for thinking is never so much as half used. But a small fraction of one hemisphere is used. With the apparatus Arcot was now using, these men received images of all space with the same clarity of detail, with which the eyes received one small portion of space. They, too, understood everything within it with equal ease, the images were perceived and comprehended by the brain with the same ease as the brain comprehends the images produced by the eyes. The great need of practice was in learning automatically the position of any object. We know in what direction our eyes are focused, but when the entire field of space is pictured, it is difficult to determine where an object pictured lies. With relation to other objects, yes. With relation to the viewer—no.

Further, they discovered an enormous obstacle in that the eye never gives us a true picture of a thing, and the brain has learned through experience to make the necessary corrections. As an optical instrument, the eye is exceedingly poor. The wonderfully efficient brain has, however, learned to make the necessary corrections. To get some picture of the eye's inaccuracies, remember that the eyeball is round. A lens throws an image on the rounded screen of the retina. Look at the reflection of a window as seen in a globe, a gold-fish bowl is perhaps the most familiar object of that nature. What shape do the straight lines of the window's edges take? Then imagine the shape the eye actually shows for that same window, or the door.

We think it perfectly natural that we can walk straight to the door, and through it without touching the wall. But imagine again the shape in which the eye pictures that door! Is it any wonder a baby, learning to make those corrections we find so automatic, has difficulty in steering a course through a room that its eyes are portraying as some futuristic artist might portray it, save that all lines, invariably, are curves?

Now Arcot and his friends, whose brains had always been forced to correct vision-images, tended to correct the images now received, though these were correct images. In time a different sight-center developed in their brains, that did not tend to correct, but for a while the men were afflicted with terrific headaches, and were continually stumbling into things when not using the apparatus as their brains neglected to correct for eye-distortion.

But in the end their brains had developed the two abilities, and the full vision and full comprehension of everything that happened around the ship and within it was theirs. Then Arcot announced he was ready to go.

They had been almost two weeks learning this, and now, just before starting off for their attack on Thett, they stopped once more on Earth to gather food supplies. There was now no necessity for gathering energy supplies. Anywhere they would find those, anywhere save in the cosmic ray regions. Through such regions they did not intend to go, but there they could, if necessity demanded, use the stored energy in their huge coils, the equivalent of more than two thousand tons of lead.

But foods they did need. Water, oxygen or any elemental need they could take care of by transmutation of any electricity base matter they found.

Their stay was brief, and already Earth and its allies were falling back into the ways of peace and commerce. The passenger and freight traffic to Venus were almost up to normal, and already companies had been organized to trade with Ortol, Sirius and Talso. Exploration ships were starting out to those other planetary systems, which had been marked on the Thessian charts.

And somewhere out in the void a lone ship was racing across the infinite void back to Ortol, far faster than light, but slow for such a trip. It would be nearly two and a half months before they would know that their world had been protected by that distant race whose aid they had sought when they came to Earth. That captured Thessian ship of Ortol had not yet reached home, nor would it for long land there.

But soon Arcot's supplies were filled, and they were ready to travel to that distant Universe they had determined to be the home of Thett's forces. It was far more distant than Thansal, as the Island of Space which contained Nansal, Torlos' home, had been named, for it was nearly one hundred and fifty million light years across the void!

CHAPTER XXIV

Venone

Up from Earth, out of its clear blue sky, and into the glare and dark of space and near a sun the ship soared. They had been holding it motionless over New York, and now as it rose, hundreds of tiny craft, and a few large excursion ships followed it until it was out of Earth's atmosphere. Then—it was gone. Gone across space, racing toward that far Universe at a speed no other thing could equal. In minutes the great disc of the Universe had taken form behind them, as they took their route photographs to find their way back to Earth after the battle, if still they could come.

Then into the stillness of the Intergalactic spaces.

"This will be our first opportunity to test the full speed of this ship. We have never tried its velocity, and we should measure it now. Take a sight on the diameter of the Island, as seen from here, Morey. Then we will travel ten seconds, and look again."

Half a million miles from the center of the Island now, the great disc spread out over the vast space behind them, apparently the size of a dinner plate at about 30 inches distance, it was more than two hundred and fifty thousand light years across. Checking carefully, Morey read their distance as just shy of five hundred thousand light years.

"Hold on—here we go," called Arcot. Space was suddenly black, and beside them ran the twin ghost ships that follow always when space is closed to the smallest compass, for light leaving, goes around a space whose radius is measured in miles, instead of light centuries and returns. There was no sound, no slightest vibration, only Torlos' iron bones felt a slight shock as the inconceivable currents flowed into the gigantic space distortion coil from the storage fields, their shielded magnetic flux leaking by in some slight degree.

For ten seconds that seemed minutes Arcot held the ship on the course under the maximum combined powers of space distortion and time field distortion. Then he released both simultaneously.

The velvet black of space was about them as before, but now the disc of the Nebula was tiny behind them! So tiny was it, that these men. who knew its magnitude, gasped in sudden wonder. None of them had been able to conceive of such a velocity as this ship had shown! In ten seconds, Morey announced a moment later, they had traveled *one million, one hundred thousand light years!* Their velocity was six hundred and sixty quadrillion miles per second!

"Then it will take us only a little over one thousand seconds to travel the hundred and fifty million light years, at 110,000 light years per second—that's about the radius of our galaxy isn't it!" exclaimed Wade.

"And your Galaxy, Earth man, is the largest there is," pointed out Torlos.

They started on now, and one thousand and ten seconds, or a little more than eighteen minutes later, they stopped again. So far behind them now as to be almost lost in the far scattered universes, lay their own Island, and carefully they photographed and marked it. Then they photographed the Universe that now lay less than twenty million light years ahead. Still, it was further, even after crossing this enormous gulf, than are many of those nebulae we see from Earth, many of which lie within that distance. They must proceed cautiously now, for they did not know the exact distance to the Nebula. Carefully, running forward in jumps of five million light years, forty-five second drives, they worked nearer.

Then finally they entered the Island, and drove toward the denser center.

"Good Lord, Arcot, look at those suns!" exclaimed Morey in amazement. For the first time they were seeing the suns of this system at a range that permitted observation, and Arcot had stopped to observe. The first one they had chosen had been a blue-white giant of enormous mass, nearly one hundred and fifty times as heavy as our own sun, and all the enormous surface was radiating power into space at a rate of nearly thirty thousand horsepower per square inch! No planets circled it, however, in its journey through space.

"I've been noticing the number of red giants here. Look around. They are literally thick around us. Every one of these stars seems to be a giant. I can understand it though. Remember, our Island is the largest there is. When it condensed from the primeval chaotic gas that filled all space, its mass was greatest, and hence it contracted upon itself far more than the others and its density became greater. It is not enormously larger in bulk than many other Islands, but it is tremendously greater in mass. Its density is higher. Remember, gravitational instability does not begin to act until density, temperature of the gas, and mass of the condensation are such that the outermost layers of the condensation can be bound by the gravitational attraction of the whole. And, the bigger it is, the faster it grows once it gets started. Remember, our Island is rather further than the other islands from their nearest neighbors. The average distance to neighbor Islands is greater. If they came too near during that time when each was a single enormous mass of gas, ours, with its inconceivable gravitational pull, would tear them to pieces, by Roche's law, and probably gobble them up.

"But when suns formed in our dense, heavy galactic mass, the density of the gas permitted small masses to remain stable, to form, in other words. The masses were, of course, suns, and the suns of our system are generally of a size a bit smaller than our own star.

"But in this system, which, as we observe, is an unusually small galaxy, indeed of a size barely above the lower limit possible for a galaxy (for no galaxy can be less than about five hundred million sun-masses) the density of the gas as it fell together under its own gravitational attraction, must have been far less than in ours. The result was the formation of suns not of masses of the order of our sun, but of an order far higher.

"Now we have large suns here, and would expect large planets. If we find the run of sun-masses such as two hundred and even four hundred times our sun's mass, I shall not be surprised, and a sun four hundred times ours would easily throw off a planet four hundred times as massive as Jupiter! No wonder those fellows liked heavy worlds!"

WHAT Arcot had said was correct, but he forgot a second fact, that when such enormous suns did pass to make planets, the inconceivably great pulls on them due to tidal action, far greater than our type of sun would produce, would tend to tear off masses for longer periods, as their passing would be slower, their gravitational arms longer, and might strip the entire photosphere from a sun. This tended to make few, but proportionately larger planets.

Thett, for example, was one of four planets which revolved around the sun Antseck. Their combined mass was nearly one one-hundredth that of their primary. The entire photosphere of Antseck had been swept off in their making, and gathered in these four great masses with their satellites.

But soon the *Thought* moved on, on to other suns. They must find one that was inhabited.

They stopped at last near a great orange giant, and examined it. It had indeed planets, and as Arcot watched, he saw in the Telectroscope a line of gigantic freighters rise from the world, and whisk off to nothingness as they exceeded the speed of light! Instantly he started the *Thought* searching in time fields for the freighters. Soon he found them, and followed them as they raced across the void. He knew he was visible to them, and as he suspected, they soon stopped, slowing down and signaling to him.

"Morey—take the *Thought.* I'm going to visit them in the *Banderlog* as I think we shall name the tender," called Arcot, stripping off the headset, and leaving the control seat. The other fleet of ships was now less than a hundred thousand miles away, clearly visible in the telectroscope. They were still signaling, and Arcot had set an automatic signaling device flashing an enormously powerful searchlight toward them in a succession of dots and dashes, an obvious signal, though also, obviously unintelligible to those others.

"Is it safe, Arcot?" asked Torlos anxiously. To approach those enormous ships in the relatively tiny *Banderlog,* seemed unwise.

"Far safer than they'll believe. Remember, only the *Thought* could stand up against such weapons as even the *Banderlog* carries, run as they are by cosmic energy," replied Arcot, diving down toward the little tender.

In a moment it was out through the lock, and sped away from them like a bullet, reaching the distant stranger fleet in less than ten seconds.

"They are communicating by thought!" announced Zezdon Afthen presently. "But I cannot understand them, for the impulses are too weak to be intelligently received."

For nearly an hour the *Banderlog* hung beside the fleet, then it turned about, and raced once more to the *Thought.* Inside the lock, and a moment later Arcot appeared again on the threshold of the door. He looked immensely relieved.

"Well, I have some good news," he said and smiled, sitting down. "Follow that bunch, Morey, and I'll tell you about it. Set it and she'll hold nicely. We have a long way to go, and those are slow freighters, accompanied by one Cruiser.

"Those men," he began, "are men of Venone. You remember Thett's records said something of the Mighty Warless Ones of Venone? Those are they. They inhabit most of this universe, leaving the Thessians but four planets of a minor sun, way off in one corner. It seems the Thessians are their undesirable exiles, those who have, from generation to generation, been either forced to go there, or who wanted to go there.

"They did not like the easier and more effective method of disposing of undesirables, the instantaneous death chamber they now use. Thett was their prison world. No one ever returned, and his family could go with him if they desired, but if they did not, they were carefully watched for outcroppings of undesirable traits—murder, crime of any sort, any habitual tendency to injustice.

"About six hundred years ago of our time, Thett revolted. There were scientists there, and their scientists had discovered a thing that they had been seeking for generations—the Twin-ray. I don't know what it is, and the Venonians don't either. It is the ray that destroys relux and lux, however, and can be carried only on a machine the size of their forts, due to some limitation. Just what those limitations are the Venonians don't know. Other than that ray they had no new weapons.

"But it was enough. Their guard ships which had circled the worlds of the prison system, Antseck, were suddenly destroyed, so suddenly that Venone received no word of it till a consignment ship, bringing prisoners, discovered their absence. The consignment ship returned without landing. Thett was now independent. But they were bound to their system, for although they had the molecular ships, they had never been permitted to have time apparatus, nor to see it, nor was any one who knew its principles ever consigned there. The result was that they were as isolated as ever.

"This was for two centuries. Two centuries later it was worked out by one of their scientists, and the Warless Ones had a War of defense. Their small fleet of cruisers, designed for rescue work and for clearing space lanes of wrecks and asteroids, was destroyed instantly, their world was protected only by the ray screen, which the Thessians did not have, and by the fact that they could build more cruisers. In less than a year Thett was defeated, and beaten back to her world, though Venone could not overcome Thett, now, for around their planets they had so many forts projecting the deadly rays, that no ship could approach.

"Then Thett learned how to make the screen, and came again. Venone had planetoid stations, that projected molecular rays of an intensity I wonder at, with their system of projecting. It seems these people have force-power feeds that operate through space, by which an entire solar system can tie in for power, and they fed these stations in that way. Lord only knows what tubes they had, but the Thessians couldn't get the power to fight.

"They've been let alone since then, they did not know why. I told them what their dear friends had been doing in that time, and the Venonians were immensely surprised, and very evidently sorry. They begged my pardon for letting loose such a menace, quite sincerely feeling that it was their fault. They offered any help they could give, and I told them that a chart of this system would be of the greatest use. They are going now to Venone, and we are to go with them, and see what they have to offer. Also, they want a demonstration of this 'remarkable ship that can defeat whole fleets of Thessians, and destroy or make planets at will'," concluded Arcot.

"I do not in the least blame them for wanting to see this ship in operation, Arcot, but they are, very evidently, a much older race than yours," said Torlos, his thoughts coming clear and sharp, as those of a man who has thought over what he says carefully. "Are you not running danger that their minds may be more powerful than yours, that this story they have told you is but a ruse to get this ship on their world where thousands, millions can concentrate their will against you and capture the ship by mind where they cannot capture it by force?"

"That," agreed Arcot, "is where 'the rub' comes in as an ancient poet of Earth put it. I don't know, and I did not have a chance to see. Wherefore I am about to do some work. Let me have the controls, Morey, will you?"

Arcot took the ship, and locked the drive for the present speed and position in relation to the Venonian freighters, and proceeded to work.

The ship was traveling solely on the time device, and so the energy of space was available, as it was not when using the space drive, since then only their own energy could be tapped, and then only if a fluctuation could be caused. But now Arcot had the energy of more than a million giant suns, each radiating far faster than four hundred suns such as ours would do, for a giant sun generates at a far higher rate per ton than a main-sequence sun. Doubling the mass does not double the energy generation rate of a sun, but increases it far more than twice. Sirius, only two and a half times as massive as Sol, generates twenty-six times as much energy. Here, despite the smaller Universe, supplying his power-generation stations, Arcot had fully as great an energy supply as in his own giant Island.

SO now he made a new ship. It was made entirely, perforce, of cosmium, lux and relux, for those were the only forms of matter he could create in space permanently from energy. It was equipped with gravity drive, and time distortion speed apparatus, and his far better trained mind finished this smaller ship with his titanic tools in less than the two days that it took them to reach Venone. In the meantime, the Venonian cruiser had drawn close, and watched in amazement as the ship was fashioned from the energy of space, became a thing of glistening matter, materializing from the absolute void of space, and forming under titanic tools such as the commander could not visualize.

Now this move was partly the reason for this construction, for while the Venonian was busy, absorbed in watching the miraculous construction, his mind was not shielded, and it was open for observation of two such wonderfully trained minds as those of Zezdon Afthen and Zezdon Inthel. With their instruments, and wonderfully developed mind-science, aided at times by Morey's less skillful, but more powerful mind of his older race, and powerful too, both because of long concentration and training, and because of his individual inheritance, they examined the minds of many of the officers of the ship without their awareness.

As a final test Arcot, having finished the ship, suggested that the Venonian officer and one of the men of his ship have a trial of mental powers.

Zezdon Afthen tried first, and between the two ships, racing along side by side at a speed unthinkable, the two men struggled with those forces of will, the full secrets of which none yet has learned, more than those men of the twentieth century learned the full truth of electricity, with which they did their amazingly great works considering their almost primitive tools. How could those mental forces cross that void through walls of cosmium and relux, and remain unchanged? How could they travel faster than light, as they must, to reach their destination?

We do not know, nor did they who used them then know. Though Zezdon Afthen struggled, his mind was not equal to that of the Venonian, and quickly he was in the passive state. Each was gazing at the image of the other as seen in the vision screens, and the Venonian saw that he had succeeded, and released the Ortolian.

Quickly Zezdon Afthen told Arcot what he had learned.

These men were old, and their minds strong, but they, like Terrestrians, had never trained the forces of will to work for them, but had relied on the forces of Nature. They could not, as could Ortolians, concentrate the combined will of many with effect. But Zezdon Afthen had been unable to overcome his opponent, and hence had not learned the full truths he had hoped for.

Arcot had put the machine on manual control during this trial, as the mental forces interfered with its control, and now he turned all over to Morey.

"This seems a tremendous amount of effort to take over this one point," he said and smiled, "but it is an enormously important point, for we can be sure that the results we find for Venonians will also be true for Thessians in a large degree. If not, one people or the other would have ended this conflict long ago."

And he tried it! Sitting in the chair before the visiplate, he looked at the image of the short, powerful man in the other ship, and threw all the power of his mind into the effort. But, like some solid wall, he could feel the mental force of the iron-boned Venonian. The eyes before him on the screen seemed enlarging, growing to fill all his sight.

With an effort he forced back that feeling the Venonian had caused, and concentrating his force on the one idea of blackness, he brought into use those countless billions of newly developed cells that his machine had stimulated in teaching him to see in all directions at once.

Eyes seemed to intrude on that black, starry vault he pictured, as the Venonian attempted to force back the picture that their rapport was causing in his mind as well as in Arcot's. But gradually the light and images on the smooth blackness faded, and then the greyness faded, and the vault was black all about. But it faded to black last directly before him, and Arcot realized that in that section alone had the Venonian's brain been able to meet and resist the foreign sight-impression.

One impression Arcot had succeeded in forcing upon his opponent, an impression of black, starry sky. Now he wiped out the stars, and sheer blackness of intergalactic space alone appeared. And again, the stars directly ahead lasted longest, faded last.

Next all about was blankness—and Arcot forced upon the Venonian's brain the conviction that it was sleeping, and the blankness was the blankness of unconsciousness.

Slowly the almost physical force that had been fighting him faded, and Arcot realized that his opponent was "convinced," defeated.

Arcot let the impressions he had so forced upon his own brain relax now, and before him, on the view screen, he saw the face of the Venonian, and the eyes were closed. He glanced about the room, a tired smile on his face—then stared. The Nansalian was sleeping too, the sleep of the Venonian! No wonder there had been such a multiplicity of eyes—Torlos, by some mischance, had been caught in his rapport as well as the Venonian, and had, necessarily, fought with him!

While the Venonian slept now, Zezdon Afthen and Inthel worked rapidly, and soon declared that a trip to Venone would be safe, that all Arcot had learned was indeed true.

The easiest way now to wake the two, was to wake Torlos, and in a moment it was done. Torlos stared uncomprehendingly a moment, then grinned sheepishly, and waved to Arcot.

"I am sorry—I was too interested, and made the mistake of following your thoughts too long. Then when I struggled to free my mind, I was caught in such forces as I had not dreamed of. I think it was the awakening of the Venonian that brought me back!"

"Terrestrian," came suddenly the thought from the Venonian ship, "that is not the first time I have tried that pastime in my monotonous vigils in space, and always have we forced upon our opponent the vision of some object of common, daily experience. But you overcame me by imagination, by picturing a thing I have never before pictured—the heavens as seen in all directions simultaneously! And I know, too, that you fought not one, but two! You say your race is young. If a young race can develop such brains as yours, it is best we of Venone cement our friendship now!"

Though Arcot realized that he did not deserve the full of this praise, in that it had not been imagination, but actual experience that had permitted him to visualize the heavens, as seen simultaneously in all directions as no living creature could see them, he stored away in his mind for future use the fact that such an impression, such a vision was one that no living creature who had not thus seen them could capably fight, for while he fought with mental experience, the opponent would have to use imagination.

The sun of Venone was close, now, and Arcot prepared to use as he intended the little space machine he had made. Morey took it, and went away from the *Thought* flying on its time field. The ship had been stocked with lead fuel for its matter-burning generators from the supply that had been brought on the *Thought* for emergencies, and the air had come from the *Thought's* great tanks. Morey was going to Venone ahead of the *Thought* to scout—"to see if they could safely approach so huge a planet," as Arcot explained.

HOURS later Morey returned with a favorable report. He had seen many of the important men of Venone, and conversed with them mentally from the safety of his ship, where the specially installed gravity apparatus had protected him and the ship against the enormous gravity of this gigantic world. He did not describe Venone; he wanted them to see it as he had first seen it.

So the little ship, which had served its purpose now, was destroyed, nearly a light year from Venone, and left a crushed wreck when two plates of artificial matter had closed upon it, destroying the apparatus, lest some unwelcome finder use it. There was little about it, the gravity apparatus alone perhaps, that might have been of use to Thett, and Thett already had the ray—so why take needless risk?

Then once more they were racing toward Venone. Soon the giant star of which it was a planet loomed enormous. Then, at Morey's direction, they swung, and before them loomed a planet. Large as Thett, near a half million miles in diameter, its mass was very closely equal to that of our sun. Yet it was but the burnt-out sweepings of the outermost photospheric layers of this giant sun, and the radioactive atoms that make a sun active were not here, it was a cold planet. But its density was far, far higher than that of our sun, for our sun is but slightly denser than ordinary sea water. This world was dense as copper, for with the deeper sweepings of the tidal strains that had formed it, more of the heavier atoms had gone into its making, and its core was denser than that of Earth; nearly eleven was its density.

About it swept two gigantic satellite worlds, each larger than Jupiter, but satellites of a satellite here! And Venone itself was inhabited by countless millions, yet their low, green-tile and metal cities were invisible in the aspect of rolling lands with tiny hillocks, dwarfed by gigantic bulbous trees that floated their enormous weight in the water-dense atmosphere.

Here, too, there were no seas, for the temperature was above the critical temperature of water, and only in the self-cooling bodies of these men and in the trees which similarly cooled themselves, could there be liquid.

The sun of this world was another of the giant red stars, close to three hundred and fifty times the mass of our sun. It was circled by but three giant planets. Its enormous disc was almost invisible from the surface of the world as the *Thought* sank slowly through fifteen thousand miles of air, due to the screening effect on light passing through so much air. Earth could have rested on this planet and not extended beyond its atmosphere! Had Earth been situated at this planet's center, the Moon could have revolved about it, and would not have been beyond the planet's surface!

In silent wonder the terrestrians watched the titanic world as they sank, and their friends looked on amazed, comprehending even less of the significance of what they saw. Already within the titanic gravitational field, they could see that indescribable effects were being produced on them, and on the ship. Arcot alone could know the enormous gravitation, and his accelerometer told him now that he was subject to a gravitational acceleration of three thousand four hundred and eighty-seven feet per second per second, or almost exactly one hundred and nine times Earth's pull.

"The *Thought* weighs one billion, two hundred and six million, five hundred thousand tons, with tender, on Earth. Here it weighs approximately one hundred and twenty-one billion tons," said Arcot softly.

"Can you set it down? It may crush under this load if the gravity drive isn't supporting it?" asked Torlos anxiously.

"Eight inches cosmium, and everything else supported by cosmium. I made this thing to stand any conceivable strain. Watch—if the planet's surface will take the load," replied Arcot.

They were still sinking, and now a number of small, marvelously streamlined ships were clustered around the slowly settling giant. In a few moments more people, hundreds, thousands of men were flying through the air up to the ship.

"There are your 'aquatic' people, Arcot," said Morey.

"I can see them a lot better with this than you can with your eyes," replied Arcot, smiling, "but I notice something else. Their skins, those of the Thessians, I mean, were reddish, you remember, and they possessed an utterly amazing lack of digestive organs, and peculiar organs they had. Remember what tiny organs they had? Now look at the amount of clothing these people wear, male and female both. Practically nothing. Aside from the fact that clothes weigh something here, mine weigh half a ton or so probably, there is reason in that. See it?"

"Lord—they can't be photo-synthetic animals!" exclaimed Morey, staring now at the people. Though he had been here for a short period before, Arcot had divined something he had not imagined. These men were photo-synthetic, or plant-like people. In a world bathed by the radiation of an enormous star, using the energy of heat for muscular power, they needed an exceedingly small amount of energy in chemical form to replace nervous energy, and to replace the body parts. Torlos, a man using the heat energy of the air, as did these people, ate very little at long intervals. These people need eat even less, for what they might eat was used only for building body materials, for the actual building bricks. Even so, like the plant, they obtained most of their materials from the air in the form of carbon dioxide and oxygen and water vapor. Their chemical action was even more perfectly balanced than that of the plant, for they could live indefinitely in a perfectly airtight vessel, needing neither external carbon dioxide supply nor external oxygen supply, though the plant consumes more carbon dioxide than it gives off.

Since their sun radiated in the red region principally, green would be the color of an object most absorptive to red light, and least absorptive to others, as were their plants, for the plants used the plentiful red light. But the men used high-energy quanta of the blue-green, and so had the complementary color in their skins. Though not as plentiful as the red, still its higher energy made it more available, and more desirable for them.

A cruiser had appeared, and was very evidently intent on leading them somewhere, and Arcot followed it as it streaked through the dense air. "No wonder they stream-line," he muttered as he saw the enormous force it took to drive the gigantic ship through this air. The air pressure outside their ship now was so great, that the sheer crushing effect of the air pressure alone was enormous. The pressure was well over nine tons to the square inch, on all the surface of that enormous ship!

THEY landed approximately fifty miles from a large city which was the capital. The land seemed absolutely level, and the horizon faded off in distance in an atmosphere absolutely clear. There was no dust in the air at their height of nearly three hundred feet, for dust was too heavy on this world. There were no clouds, no haze could be, for there was water only perfect, and perfectly transparent. The mountains of this enormous world were not large, could not be large, for their sheer weight would tear them down, but what mountains there were were jagged, tortured rock, exceedingly sharp in outline.

"No rain—no temperature change to break them down," said Wade looking at them. "The zone of fracture can't be deep here."

"What, Wade, is the zone of fracture? " asked Torlos.

"Rock has weight. Any substance, no matter how brittle, will flow if sufficient pressure is brought to bear from all sides. A thing which can flow will not break or fracture. You can't imagine breaking water, water, not ice. Imagine the pressure to which the rock three hundred feet down is subject to. There is the enormous mass of atmosphere, the tremendous mass of rock above, and all forced down by this gravitation. By the time you get down half a mile, the rock is under such an inconceivably great pressure that it will flow like mud. The rock there cannot break; it merely flows under pressure. That is the zone of flowage. Above, the rock can break, instead of flowing. That is the zone of fracture. On Earth the zone of fracture is ten miles deep. Here it must be of the order of only five hundred feet! And the planetary blocks that make a planet's surface float on the zone of flowage, they determine the zone of fracture."

The gigantic ship had been sinking, and now, suddenly, it gave a very unexpected demonstration of Wade's words. It had landed, and Arcot shut off the power. There was a roaring, and the giant ship trembled, rocked, and rolled along a bit. Instantly Arcot drove it into the air.

"Whoa—can't do it. The ship will stand it, and won't bend under the load—but the planet won't. We caused a Venone-quake. One of those planetary blocks Wade was talking about slipped under the added strain."

Quickly Wade explained that all the planetary blocks were floating, truly floating, and in equilibrium just as a boat must be. The added load had been sufficiently great, so that, with an already extant overload on this particular planetary block, this "boat" had sunk a bit further into the flowage zone, till it was once more at rest and balanced. Some overloading may take place, till a force great enough to overcome the friction between the planetary blocks arises. Then the slippage is sharp, and not smooth, and we have quakes.

"They wish us to come out that they may see us, strangers and friends from another Island," interrupted Zezdon Afthen.

"Tell them they'd have to scrape us up off the ground, if we attempted it. We come from a world where we weigh about as much as a pebble here," said Wade, grinning at the thought of terrestrians trying to walk on this world.

"Don't—tell them we'll be right out," said Arcot sharply. "All of us."

Morey and the others all stared at Arcot in amazement. It was utterly impossible!

But Zezdon Afthen did as Arcot had asked. Almost immediately, another Morey stepped out of the airlock, wearing what was obviously a pressure suit. Behind him came another Wade, Torlos, Stel Felso Theu, and indeed all the members of their party save Arcot himself! The Galactians stared in wonder—then comprehended and laughed together. Arcot had sent out artificial matter images of them all!

Their images stepped out, and the Venonian crowd which had collected, stared in wonder at the giants, looming twice their height above them.

"You see not us, but images of us. We cannot withstand your gravity nor your air pressure, save in the protection of our ship. But these images are true images of us."

For some time then they communicated, and finally Arcot agreed to give a demonstration of their power. At the suggestion of the cruiser commander who had seen the construction of a space ship from the emptiness of space, Arcot rapidly constructed a small, very simple, molecular drive machine of pure cosmium, making it entirely from energy. It required but minutes, and the Venonians stared in wonder as Arcot's unbelievable tools created the machine before their eyes. The completed ship Arcot gave to an official of the city who had appeared. The Venonian looked at the thing skeptically, and half expecting it to vanish like the tools that made it, gingerly entered the port. Powered as it was by lead burning cosmic ray generators, the lead alone having been made by transmutation of natural matter, it was powerful, and speedy. The official entered it, and finding it still existing, tried it out. Much to his amazement it flew, and operated perfectly.

Nearly ten hours Arcot and his friends stayed at Venone, and before they left, the Venonians, for all their vast differences of structure, had proven themselves true, kindly honest men, and a race that our Alliance has since found every reason to respect and honor. Our commerce with them, though carried on under difficulties, is none the less a bond of genuine friendship.

CHAPTER XXV

Thett Prepares

STREAKING through the void toward Thett was again a tiny scout ship. It carried but a single man, and with all the power of the machine he was darting toward distant Thett, at a speed insanely reckless, but he knew that he must maintain such a speed if his mission were to be successful.

Again a tiny ship entered Thett's far-flung atmosphere, and slowed to less than a light speed, and sent its signal call ahead. In moments the patrol ship, less than three hundred miles away, had reached it, and together they streaked through the dense air in a screaming dive toward Shatnsoma, the capital city. It was directly beneath, and it was not long before they had reached the great palace grounds, and settled on the upper roof. Then the scout leaped out of his tiny craft, and dove for the door. Flashing his credentials, he dove down, and into the first shielded room. Here precious seconds were wasted while a check was made of the credentials the man carried, then he was sent through to the Council Room. And he, too, stood on that exact spot where the other scout, but a few weeks before, had stood—and vanished. Waiting, it seemed, were four councilors and the new Sthanto, Thalt.

"What news, Scout?" asked the Sthanto.

"They have arrived in the Universe of Venone, and gone to the planet Venone. They were on the planet when I left. None of our scouts was able to approach the place, as there were innumerable Venonian watchers who would have recognized our deeper skin-color, and destroyed us. Two scouts were rayed, though the Galactians did not see this. Finally we captured two Venonians who had seen it, and attempted to force the information we needed from them. A young man and his chosen mate.

"The man would tell nothing, and we were hurried. So we turned to the girl. These accursed Venonians are courageous for all their pacifism. We were hurried, and yet it was long before we forced her to tell what we needed to know so vitally. She had been one of the notetakers for the Venonian government. We got most of their conversation, but she died of shortest-ray (cosmics) burns before she finished. We had been forced to use them too much.

"The Galactians know nothing of the twin-ray beyond its action, and that it is an electro-magnetic phenomenon, though they have been able to distort it by using a sheet of pure energy, a space strain acting on it naturally, as you, Oh Sthanto, wise one of science, can understand. But their walls are impregnable to it, and their power is so enormous that they have claimed that their strange power of creating matter from the pure energy of space, as we saw from a distance, would enable them to easily defeat it, were it not that the twin-ray passes through matter without harming it. Any ray which will destroy matter of the natural electrical types, will be stopped.

"The girl was damnably clever, for she gave us only the things we already knew, and but few new facts; knowing that she would inevitably die soon, she talked —but it was empty talk. The one thing of import we have learned is that they burn no fuel, use no fuel of any sort, but in some inconceivable manner get their energy from the radiations of the suns of space. This could not be great—but we know she told the truth, and we know their power is great. She told the truth, for we could determine when she lied, by mental action, of course.

"But more we could not learn. The man died without telling anything, merely cursing. He knew nothing anyway, as we already had determined," concluded the scout.

Silently the Sthanto sat in thought for some moments. Then he raised his head, and looked at the scout once more.

"You have done well. You secured some information of import, which was more than we had dared hope for. But you managed things poorly. The woman should not have died so soon. We can only guess.

"The radiations of the suns of space—hmmm—." Sthanto Thalt's brow wrinkled in thought. "The radiation of the *suns* of space. Were his power derived from the sun near which he is operating, he would not have said *suns*. It was more than one?"

"It was, oh Sthanto," replied the scout positively.

"His power is unreasonable. I doubt that he gave the true explanation. It may well have been that he did not trust the Venonians. I would not, for all their warless ways. But surely the suns of space give very little power at any given point picked at random. Else space would not be cold.

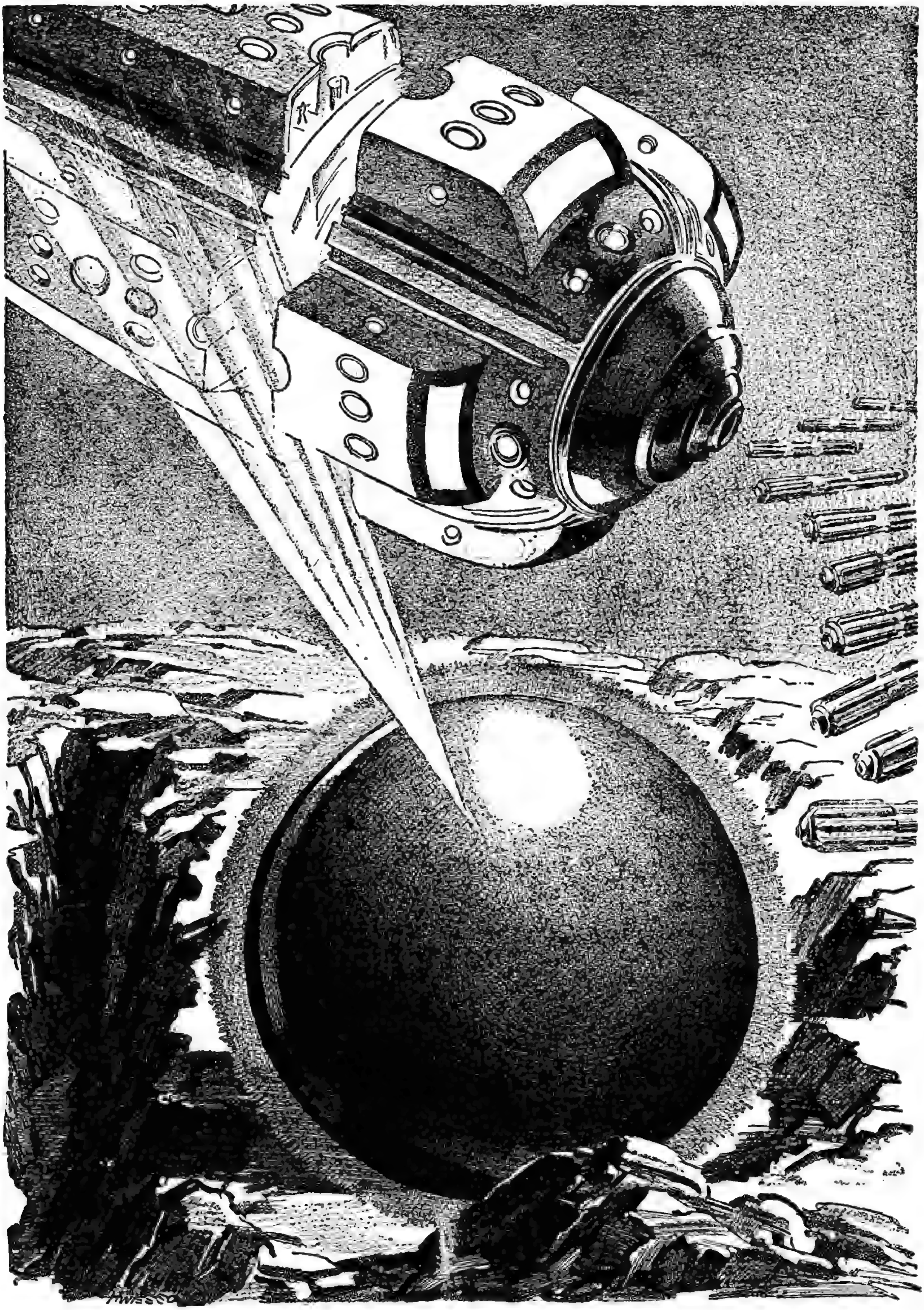
"But go, Scout, and you will be assigned a position in the fleet. The Colonial fleet, the remains of it, have arrived, and the colonists been removed. They failed. We will use their ships. You will be assigned." The scout left, and was indeed assigned to a ship of the colonists. The incoming colonial transports had been met at the outposts of the system, and rayed out of existence at once—failures, and bringing danger at their heels. Besides—there was no room for them on Thatt without Thessians being crowded uncomfortably.

As their battleships arrived they were conducted to one of the satellites, and each man was "fumigated," lest he bring diseases to the mother planet. Men entered, men apparently emerged. But they were different men.

"It seems," said the Sthanto softly, after the scout had left, "that we will have little difficulty, for they are, we know, vulnerable to the triple ray. And if we can but once destroy their driving units they will be helpless on our world. I doubt that wild tale of their using no fuel. Even if that be true they will be helpless with their power apparatus destroyed, and—if we miss the first time, we can seek it out, or drive them off!

"All of which is dependent on the fact that they attack at a point where we have a triple ray station to meet them. There are but three of these, actually, but I have had dummy stations, apparently identical with our other real stations, set up in many places.

"This gibberish we hear of creating matter—it is im-



A hundred feet of the nose was torn off the ship, and the enormously dense air of Thett rushed in.

possible, and surely unsuitable as a weapon. Their misty wall—that may be a force plane, but I know of no such possibility. The artificial substance though—why should any one make it? It but consumes energy, and once made is no more dangerous than ordinary matter, save that there is the possibility of creating it in dangerous positions. But it consumes too great an amount of energy. Force-planes—mere force planes—*plus* a wonderfully developed power of suggestion. They do most of their damage by mental impression. Remember, we have heard already of the mental suggestions of horrible things that drove one fleet of the weak-minded colonists mad.

"And that, I think, we will use to protect ourselves. If we can, with the apparatus which you, my son, have developed, cause them to believe that all the other forts are equally dangerous, and that this one on Thett is the best point of attack— It will be easy. Can you do it?"

"I can, Oh Sthanto, if but a sufficient number of powerful minds, may be brought to aid me," replied the youngest of the four councilmen.

"And you, Ranstud, are the stations ready?" asked the ruler.

"Oh, Sthanto, they are. The three stations, each with its own exceedingly powerful generators has been tied in with the great power network of the Four Planets, and the Four Satellites. We can pour into the projectors of any one station a power equivalent to more than three stinuses,"* replied the ex-assistant. "Further, we have the most efficient apparatus yet designed. Better than eighty-three per cent of the input appears in the form of the third-ray energy. It can be started in less than ten seconds."

"It should be instantaneous, like the shortest-ray," grumbled the Sthanto. Himself acquainted with the ray, he knew perfectly well it was impossible to them, for no conceivable power could create the necessary conditions in less than five seconds.

"Very well. And the force-power feeds are aligned and tuned? The forts are anchored with the new attractive ray of the colonists, and shielded by the magnetic inverter from without? What ray screens? What thickness of relux? They are supplied with an artificial atmosphere, and cooled, protected against heating, and capable of floating when the rock melts?"

"All, Mighty Sthanto. They have triple molecular ray screens with a tube we are sure is better than any tube hitherto produced, and better than any tube the enemy can use to produce his ray. We have at last succeeded in putting electricity matter in relux in its formation, and have a tube which operates perfectly up to a temperature of over one million degrees, but has not been tested completely to higher temperatures."

Since their thermometer called absolute zero, zero, and the critical temperature of water one hundred, a range of close to 650 degrees on the centigrade scale, their degrees were better than six times as great as ours. The tube would, then, operate at a temperature well into the X-ray temperatures. The radiation at this temperature would cool any conceivable object, except for the fact that relux was a nearly perfect reflector, and hence a nearly perfect non-radiator. By roughening it, however, they made it radiate and cool itself.

"What about the effect of the field in disintegrating the relux?" snapped the Sthanto.

"The frequency generated is above that wanted in the actual molecular rays or in the screen, and sufficiently high for the danger region to be passed. A screen-field slows the frequency to the desired quantum-energy," replied the Councilor of Science.

"The forts are anchored with attraction beams, and are so stabilized that they will remain in the position chosen under any conceivable force. The magnetic screen is not such as the colonists used, for that proved valueless, but was developed by following out your work on Fields-5783-ZA-21 through 84. The new field does not fight the magnetic field but by-passes it. It is a super-permeable space condition, and leads the magnetic field around, as iron will lead it around a piece of copper. To care for stray flux, there is an inner magnetic reverser.

"The relux is fifty feet thick, and under even such a molecular beam as we now possess, it would withstand the attack itself for two hours, disintegration being retarded by our ability to maintain through it the constructive field.

"I fully believe that we have an armor and an armory far superior to our opponent, provided only he does not operate on the radiation of the suns of space in some way. Our sun alone destroys matter at an unthinkable rate. If he can collect its energy—but then, why think of such things? It would be utterly and absolutely impossible to collect energy so distributed, and certainly beyond reason to imagine that such a power could be handled even were it collected," declared Ranstud stoutly, overlooking the fact that the sun itself was collected, and did handle that energy without difficulty. But—men believe what they wish to believe. And though they had no reason to fear a ship which would be vulnerable to their new weapon, they did not like to admit that any other race could surpass them in knowledge.

CHAPTER XXVI

With Galaxies in the Balance

THE *Thought* rose from Venone after long hours, and at Arcot's suggestion, they assumed an orbit about the world, at a distance of two million miles, and all on board slept, save Torlos, the tireless molecular motion machine of flesh and iron. He acted as guard, and as he had slept but four days before, he explained there was really no reason for him to sleep as yet.

But the terrestrians would feel the greatest strain of the coming encounter, especially Arcot and Morey, for Morey was to help by repairing any damage done, by working from the control board of the *Banderlog*. The little tender had sufficient power to take care of any damages that Thett might inflict, they felt sure.

For they had not learned of the triple ray.

It was hours later that, rested and refreshed, they started for Thett. Following the great space-chart that they had been given by the Venonians, a series of blocks of clear lux metal, with tiny points of slowly disintegrating lux, such as had been used to illuminate the letters of the *Thought's* name representing suns, the colors and relative intensity being shown. Then there was a more manageable guide in the form of photographs, marked for route by constellations formations as well, which would be their actual guide.

At the maximum speed of the time apparatus, for thus they could better follow the constellations, the *Thought* plunged along in the wake of the tiny scout ship that had already landed on Thett. And, hours later, they saw the giant red sun of Antseck, the star of Thett and its system.

"We're about there," said Arcot, a peculiar tenseness showing in his thoughts. "Shall we barge right in, or wait and investigate?"

"Let's try to confer with them," said Morey slowly. "There is no real hope—but we will be better for it."

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* The stinus was equal to the power of three and one-eighth (approximately) tons of matter disintegrated in one second.

"And I," said Torlos anxiously, "think it is foolish. I am more used to war than you, for countless years my people had to fight continuously, and with an enemy of the same character as these Thessians. Unless I am far wrong, they will immediately ask you to whatever place they have best defended, and then turn on your ship everything they can bring to bear. They may do no damage—I think they will not, but—we did hear of a weapon they had been seeking which was even more deadly than the twin-ray. They might have it."

"I think you are right, Torlos, they will, if they are of the character you suppose and I suspect, invite us to their best defended point, which is the exact point we will want to attack, for with the energy-releasing system they have, I doubt if any fortification will be dependent on any other, so that weakening and destroying weaker points will still leave the strong point untouched. We will have to risk greater weapons than we know of. We will try conference. Zezdon Afthen, you can project thought further than we can. We will go to Thett itself, and you will try to confer with them. I will use manual control."

The ship was suddenly but a few millions of miles from Thett as Arcot threw on the space control for a moment. Then in moments more, the time control brought them to the outer limits of Thett's tremendous atmosphere. The moment they became visible, having slowed to normal time, a score of ships had darted toward them, and other scores were coming swiftly nearer.

Zezdon Afthen tried to communicate—and suddenly fell unconscious. Morey removed the headset he had been using, and brought him out of the trance he had been forced into by the Thessian's reply.

"They have no intention of peace, and will not treat with us," he reported shakily. "They say that all their worlds are now defended by the triple-ray!"

"They have that new weapon," said Arcot seriously, as two huge Thessian battleships exploded into terrific flashing energy on the impenetrable wall of artificial matter that surrounded the ship. They had dived on it at more than fifty times the speed of light. The soil beneath was a pool of lava for a hundred miles around, and for many more miles glowed red, for already a perfect shower of fire was lacing over the great artificial matter wall. Thett was pouring cosmics at the ship, and the ship fought back with equal energy, while Arcot talked.

"We'll have to chance it. Where is their main fort here?"

"From the direction, I should say it was to the left and ahead of our position," replied Zezdon Afthen.

The ship moved ahead, while about it the tremendous Thessian battle-fleet buzzed like flies, thousands of ships now, and more coming with each second.

In a few moments the titanic ship had crossed a great plain, and came to a region of bare, rocky hills several hundred feet high. Set in those hills, surrounded by them, was a huge sphere, resting on the ground. As though by magic the Thessian fleet cleared away from the *Thought*. The last one had not left, when Arcot shot a terrific cosmic ray toward that sphere. It was relux, and he knew it, but he knew what would happen when that cosmic ray hit it. The solometer flickered and steadied at three as that inconceivable ray flashed out.

Instantly there was a terrific explosion. The soil exploded into hydrogen atoms, and expanded under heat that lashed it to more than a million degrees in the tiniest fraction of a second. The terrific recoil of the ray-pressure was taken by all space, for it was generated in space itself, but the direct pressure struck the planet, and that titanic planet reeled! A tremendous fissure opened, and the section that had been struck by the ray smashed its way suddenly far into the planet, and a geyser of fluid rock rolled over it, twenty miles deep in that world. The relux sphere had been struck by the ray, and had turned it, with the result that it was pushed doubly hard. The enormously thick relux strained and dented, then shot down as a whole, into the incandescent rock.

For miles the vaporized rock was boiling off. Then the fort sent out a cosmic, and that cosmic blasted the rock that had flowed over it as Arcot's titanic ray snapped out. In moments the fort was at the surface again—and a molecular hit it. The molecular did not have the energy the cosmic had carried, but it was a single concentrated beam of destruction ten feet across. It struck the fort—and the fort recoiled under its energy. The marvelous new tubes that ran its ray screen flashed instantly to a temperature inconceivable, and, so long as the elements embedded in the infusible relux remained the metals they were, those tubes could not fail. But they were being lashed by the energy of half a sun. The tubes failed. The elements heated to that enormous temperature when elements cannot exist—and broke to other elements that did not resist. The relux flashed into blinding iridescence——

AND from the fort came a beam of pure silvery light. It struck the *Thought* just behind the bow, for the operator was aiming for the point where he knew the control room and pilot must be. But Arcot had designed the ship for mental control, which the enemy operator could not guess. The beam was a flat beam, perhaps an inch thick, but it fanned out to fifty feet width. And where it touched the *Thought*, there was a terrific explosion, and inconceivably violent energy lashed out as the cosmium instantaneously liberated its energy. A hundred feet of the nose was torn off the ship, and the enormously dense air of Thett rushed in. But that beam had cut through the very edge of one of the ray projectors, or better, one of the ray feed apparatus. And the ray feed released the energy of space as it was designed to release it, and it released it without control; it released all the energy it could suck in from space about it, as one single beam of cosmic energy, somewhat lower than the regular cosmics, and it flashed out in a beam as solid as matter. There was air about the ship, and the air instantly exploded into atoms of a different sort, threw off their electrons, and were raised to the temperature at which no atom can exist, and became protons and electrons. But so rapidly was that coil sucking energy from space, that space tended to close in about it, and in enormous spurts the energy flooded out. It was directed almost straight up, and but one ship was caught in its beam. It was made of relux, but the relux was powdered under the inconceivable blow that countless quintillions of cosmic ray photons struck it. That ray was in fact, a solid mass of cosmium moving with the velocity of light. And it was headed for that satellite of Thett, which it would reach in a few hours time.

The *Thought*, due to the spatial strains of the wounded coil, was constantly rushing away to an almost infinite distance, as the ship approached that other space toward which the coil tended with its load, and rushing back, as the coil, reaching a spatial condition which supplied no energy, fell back. In a hundredth of a second it had reached equilibrium, and they were in a weirdly, terribly distorted space. But the triple-ray of the Thessians seemed to sheer off, and miss, no matter how it was directed. And it was painfully weak, for the coil sucked up the energy of whatsoever matter disintegrated in the neighborhood.

Then suddenly the performance was over. And they plunged into artificial space that was black, and clean, and not a thing of wavering, struggling energies. Morey, from his control in the *Banderlog*, had succeeded in getting sufficient energy, by using his space distortion coils, to destroy the great projector mechanism. Instantly Arcot, now able to create the artificial space without the destruction of the coils by the struggling ray-feed coil, had thrown them to comparative safety.

Space writhed before they could so much as turn from the instruments. The Thessians had located their artificial space, and reached it with an attraction ray. They already had been withstanding the drain of the enormous fields of the giant planet and the giant sun, the attractive ray was an added strain. Arcot looked at his instruments, and with a grim smile set a single dial. The space about them became black again.

"Pulling our energy—merely let 'em pull. They're pulling on an ocean, not a lake this time. I don't think they'll drain those coils very quickly." He looked at his instruments. "Good for two and a half hours at this rate.

"Morey, you sure did your job then. I was helpless. The controls wouldn't answer, of course, with that titanic thing flopping its wings, so to speak. What are we going to do?"

Morey stood in the doorway, and from his pocket drew a cigarette, handed it to Arcot, another to each of the others who smoked, and lit them, and his own. "Smoke," he said, and puffed. "Smoke and think. From our last experience with a minor tragedy, it helps."

"But—but this is no minor tragedy, they have burst open the wall of this invulnerable ship, destroyed one of those enormous coils, and can do it again," exclaimed Zezdon Afthen, exceedingly nervous, so nervous that the normal courage of the man was gone. His too-psychic breeding was against him as a warrior.

"Afthen," replied Stel Felso Theu calmly, "when our friends have smoked, and thought, the *Thought* will be repaired perfectly, and it will be made invulnerable to that weapon."

"I hope so, Stel Felso Theu," smiled Arcot. He was feeling better already. "But do you know what that weapon is, Morey?"

"Got some readings on it with the *Banderlog's* instruments, and I think I do. Twin-ray is right," replied Morey.

"Hmhm—so I think. It's a super-photon. What they do is to use a field somewhat similar to the field we use in making cosmium, except that in theirs, instead of the photons lying side by side, they slide into one another, compounding. They evidently get three photons to go into one. Now, as we know, that size photon doesn't exist for the excellent reason that it can't in this space. Space closes in about it. Therefore they have a projected field to accompany it that tends to open out space—and they are using that, not the attractive ray, on us now. The result is that for a distance not too great, the triple-ray exists in normal space—then goes into another. Now the question is how can we stop it? I have an idea—have you any?"

"Yes, but my idea can't exist in this space either," grinned Morey.

"I think it can. If it's what I think, remember it will have a terrific electric field."

"It's what you think, then. Come on," Arcot and Morey went to the calculating room, while Wade took over the ship. But one of the ray-feeds had been destroyed, and they had three more in action, as well as their most important weapon, artificial matter. Wade threw on the time field, and started the emergency lead burner working to recharge the coils that the Thessians were constantly draining. Being in their own peculiar space, they could not draw energy from the stars, and Arcot didn't want to return to normal space to discharge them, unless necessary.

"How's the air pressure in the rest of the ship?" asked Wade.

"Triple normal," replied Morey. "The Thessian atmosphere leaked in and sent it up terrifically, but when we went into our own space, at the half-way point, a lot leaked out. But the ship is full of water now. It was a bit difficult coming up from the *Banderlog*, and I didn't want to breathe the air I wasn't sure of. But let's work."

THEY worked. For eight hours of the time they were now in they continued to work. The supply of lead metal gave out before the end of the fourth hour, and the coils were nearing the end of their resistance now. It would soon be necessary for Arcot to return to normal space. So they stopped, their calculations very nearly complete. Throwing all the remaining energy into the coils, they a little more than held the space about them, and moved away from Thett at a speed of about twice that of light. For an hour more Arcot worked, while the ship plowed on. Then they were ready.

As Arcot took over the controls, space reeled once more, and they were alone, far from Thett. The suns of this space were flashing and glowing about them now, and the unlimited energy of a universe was at Arcot's command. But all the remaining atmosphere in the ship had either gone instantaneously in the vacuum, or solidified as the chill of expansion froze it.

To the amazement of the extra-terrestrians, Arcot's first move was to create a titanic plane of artificial matter, and neatly **bisect the *Thought* at the middle!** He had thrown all the controls thus interrupted into neutral, and in the little more than half of the ship which contained the control cabin, was also the artificial matter control. It was busy now. With bewildering speed, with the speed of thought trained to construct, enormous masses of cosmium were appearing beside them in space as Arcot created them from pure energy. Cosmium, relux and some clear cosmium-like lux metal. Ordinary cosmium was reflective, and he wanted something with cosmium's strength, and the clearness of lux.

In seconds, under Arcot's flying thought manipulation, a great tube had been welded to the original hull, and the already gigantic ship lengthened by more than five hundred feet! Immediately great artificial matter tools gripped the broken nose-section, clamped it into place, and welded it with cosmium flowing under the inconceivable pressure till it was again a single great hull —but five hundred feet longer.

Then the Thessian fleet found them. The coils were charged now, and they could have escaped, but Arcot had to work. The Thessians were attacking with moleculars, cosmics, and a great twin-ray. Arcot could not use his magnet now, for it had been among those things severed from the control. He had two ray feeds, and the artificial matter. There were nearly three thousand ships attacking him now with a barrage of energy that was inconceivably great, but the cosmium walls merely turned it aside. It took Arcot less than ten seconds to wipe out that fleet of ships! He created a wall of artificial matter at twenty feet from the ship—and another at twenty thousand miles. It was thin, yet it was utterly impenetrable. He swept the two walls together, and forced them against each other until his instruments told him only free energy remained between them. Then he released the outer wall, and a terrific flood of energy swept out.

"I don't think we'll be attacked again," said Morey softly. They would not. Thett had only one other fleet, and had no intention of losing the powers of their generators at this time when they so badly needed them. The strange ship had retired for repairs—very well, they could attack again—and maybe——

Arcot was busy. In the great empty space that had been left, he installed a second collector coil as gigantic as the main artificial matter generator. Then he repaired the broken ray feed, and it, and the companion coil which, with it, had been in the severed nose section, were now in the same relative position to the new collector coil that they had had with relation to the artificial matter coil. Next Arcot built two more ray feeds. Now in the gigantic central power room there loomed two tremendous power collectors, and six smaller ray feed collectors.

His next work was to reconnect the severed connectors and controls. Then he began work on the really new apparatus. Nothing he had constructed so far was more than a duplicate of existing apparatus, and he had been able to do it almost instantly, from memory. Now he must vision something new to his experience, and something that was forced to exist in part in this space, and partly in another. He tried four times before the apparatus had been completed correctly, and the work occupied ten hours. But at last it was done. The *Thought* was ready now for the battle.

"Got it right at last?" asked Wade. "I hope so."

"It's right—tried it a little. I don't think you noticed it. I'm going down now to give them a nice little dose," said Arcot grimly. His ship was repaired—but they had caused him plenty of trouble.

"How long have we been out here, their time?" asked Wade.

"About an hour and a half." The *Thought* had been on the time field at all times save when the Thessian fleet attacked.

"I think, Earthman, that you are tired, and should rest, lest you make a tired thought and do great harm," suggested Zezdon Afthen.

"I want to finish it" replied Arcot, unnecessarily sharply. For he was tired.

In seconds the *Thought* was once more over that fortified station in the mountains—and the Triple-ray reached out—and suddenly, about the ship, was a wall of absolute, utter blackness. The Triple-ray touched it, and exploded into corruscating, blinding energy. It could not penetrate it. More energy lashed at the wall of blackness as the operators within the sphere-fort turned in the energy of all the generators under their control. The ground about the fort was a great lake of dazzling lava as far as the eye could see, for the Triple-ray was releasing its energy, and the wall of black was releasing an equal, and opposing energy!

"Stopped!" cried Arcot happily. "Now here is where we give them something to think about. The magnet and the cosmics!"

He turned the two enormous forces simultaneously on the point where he knew the fort was, though it was invisible behind the wall of black that protected him. From his side, the energy of the spot where all the system of Thett was throwing its forces, was invisible.

Then he released them. Instantly there was a terrific gout of light on that wall of blackness. The ship trembled, and space turned grey about them. The black wall dissolved into greyness in one spot, as a flood of energy beyond comprehension exploded from it. The enormously strong cosmium wall dented as the pressure of the escaping radiation struck it, and turned X-ray hot under the minute percentage it absorbed. The Triple-ray bent away, and faded to black as the cosmic force playing about it, actually twisted space beyond all power of its mechanism to overcome. Then, in the tiniest fraction of a second it was over, and again there was blackness and only the brilliant, blinding blue of the cosmium wall testified to its enormous temperature, cooling now far more slowly through green to red.

"LORD—you're right Zezdon Afthen. I'm going to sleep," called Arcot. And the ship was suddenly far, far away from Thett. Morey took it over, and Arcot slept. First Morey straightened the uninjured wall and ironed out the dents.

"What, Morey, is the wall of Blackness?" asked Stel Felso Theu.

"It's solid matter. A thing that you never saw before. That wall of matter is made of a double layer of protons lying one against the other. It absorbs absolutely every and all radiation, and because it is solid matter, not tiny sprinklings of matter in empty space, as is the matter of even the densest star, it stops the triple-ray. It is not 'neutronium,' because cosmic rays are where neutronium would be if it existed. If a proton and an electron coalesces, we get, not nutronium, but cosmic rays. That matter is nothing but protons; there are no electrons there, and the positive electrical field is inconceivably great, but it is artificial matter, and that electrical field exerts its strain not in pulling and electrifying other bodies, but in holding space open, in keeping it from closing in about that concentrated matter, just as it does about a single proton, except that here the entire field energy is so absorbed.

"Arcot was tired, and forgot. He turned his magnet and his cosmics against it. The cosmics fought the solid matter with the same energy that created it, and with an energy that had resources as great. The magnet curved space about it, and about us. The result was the terrific energy release you saw, and the hole in the wall. All Thett couldn't make any impression on it. One of the rays blasted a hole in it," said Morey with a laugh. For he, too, loved this mighty thing, the almost living ideas of his friend's brain.

"But it is as bad as the space defense. It works both ways. We can't send through it, but neither can they. Any thing we use that attacks them, attacks it, and so destroys it—and it fights."

"We're worse off than ever!" said Morey gloomily.

"My friend, you, too, are tired. Sleep, sleep soundly, sleep till I call—sleep!" And Morey slept under Zezdon Afthen's will, till Torlos carried him gently to his room. Then Afthen let the sleep relax to a natural one. Wade decided he might as well follow under his own power, for now he knew he was tired, and could not overcome Zezdon Afthen, who was not.

On Thett, the fort was undestroyed, and now floating on its power units in a sea of blazing lava. Within men were working quickly to install a second set of the new tubes in the molecular motion ray screen, and other men were transmitting the orders of the Sthanto who had come here as the place of actually greatest safety.

"Order all battleships to the nearest power-feed station, and command that all power available be transmitted to the station attacked. I believe it will be this one. There is no limit on the power transmission lines, and we need all possible power," he commanded his son, now in charge of all land and spatial forces.

"And Ranstud, what happened to that molecular ray screen?"

"I do not know. I cannot understand such power, for the tubes, it has been proved, heated to a temperture of over three thousand six hundred million degrees, before they ceased operating. This happened in less than one-one hundredth of a dnoces (second). The power that could do that is inconceivably great. For there are more than fifty times the area of my hand which can radiate away the heat."

What Ranstud referred to was the fact that an area of one square inch at that temperature, the temperature that will break atoms, rearrange their nuclei, can radiate away energy at the rate of 65×10^{26} horsepower. And since there were approximately two hundred square inches radiating, that meant power was flowing in at more than 13×10^{26} horsepower!*

"Of course, over and above that terrific power of radiation loss, he was fighting our own not inconsiderable energy. And so those tubes lasted only long enough to flash once. It is really useless to attempt to fight that ray.

"Then the effect we witnessed when his cosmic hit us—I could not have conceived of such power. I am sure that we seriously damaged the ship when they were forced to retire. That ray that left it was pointed in the direction of our satellite, and I am worried as to its fate. We cannot know till the light which has been generated by that beam reaches our observatories. The power from their stations is still flowing in, of course, as from the other stations, but it is power that left some time ago.

"But what most worries me is his wall of darkness," said Ranstud seriously.

"But he was forced to retire for all his wall of darkness, as you saw.

"He can maintain it but a short time, and it was full of holes when he fled."

"Old Sthanto is much too confident, I believe," said an assistant working at one of the great boards in the enemy's fort, to one of his friends. "And I think he has lost his science-knowledge. Any power-man could tell what happened. They tried to use their own big rays against us, and their screen stopped them from going out, just as it stopped ours on the way in. Ours had been working at it for seconds, and hadn't bothered them. Then for a bare instant their ray touched it—and they retired. That shield of blackness is absolutely new."

"They have many men on that ship of theirs," replied his friend, helping to lift the three hundred ton load of a vacuum tube into place, "for it is evident that they built new apparatus, and it is evident their ship was increased in size to contain it. Also the nose was repaired. They probably worked under a time field, for they accomplished an impossible amount of work in the period they were gone."

Ranstud had come up behind them, and overheard the latter part of this conversation. "And what," he asked suddenly, "did your meters tell you when our ray opened his ship?"

"Councilor of Science-wisdom, they told us that our power diminished, and our generators gave off but little power when his rays gave much, and they told us that when his power was exceedingly little, we still had much."

"Have you heard the myth of the source of his power, in the story that he gets it from all the stars of the Island?"

"We have, Great Councilor. And I for one believe it, for he sucked the power from our generators, so might he suck the power from the inconceivably greater generators of the Suns. I believe that we should treat with them, for if they be like the peace-loving fools of Venone, we might win a respite in which to learn their secret."

Ranstud walked away slowly. He agreed, in his heart, but he loved life too well to tell the Sthanto what to do, and he had no intention of sacrificing himself for the possible good of the race.

So they prepared for another attack of the *Thought*, and waited.

CHAPTER XXVII

Man, Creator and Destroyer

"WHAT we must find," said Arcot, between contented puffs, for he had slept well, and his breakfast had been good, "is some weapon which will attack them, but won't attack us. The question is, what is it? And I think, I think—I know." His eyes were dreamy, his thoughts so cryptically abbreviated that not even Morey could follow them.

"Fine—what is it?" asked Morey after vainly striving to deduce some sense from the formulas that were chasing through Arcot's thoughts. Here and there he recognized them: Einstein's energy formula, Planck's quantum formulas, Nitsu Thansi's electron interference formulas, Stebkowfski's proton interference, Williamson's electric field, and his own formulas appeared, and others so abbreviated he could not recognize them.

"Do you remember what Dad said about the way the Thessians made the giant forts out in space—hauled matter from the moon and transformed it to lux and relux. 'Member I said then I thought it might be a ray—but found it wasn't what I thought? I want to use the ray I was thinking of. The only question in my mind is—what is going to happen to us when I use it?"

"What's the ray?"

"Why is it, Morey, that an electron falls through the different quantum energy levels, falls successively lower and lower till it reaches its 'lowest energy level,' and can radiate no more. Why can't it fill another step, and reach the proton? Why has it no more quanta to release? We know that electrons tend to fall always to lower energy level orbits. Why do they stop?"

"And," said Morey, his own eyes dreamily bright now, "What would happen if it did? If it fell all the way?"

"I cannot follow your thoughts, Earthmen, beyond a glimpse of an explosion. And it seems that is Thett that is exploding, and that Thett is exploding itself. Can you explain?" asked Stel Felso Theu.

"Perhaps—you know that electrons in their planetary orbits, so called, tend to fall always to orbits of lower energy, till they reach the lowest energy orbit, and remain fixed till more energy comes and is absorbed, driving them out again. Now we want to know why they don't fall lower, fall all the way? As a matter of fact, thanks to some work I did last year with disintegrating lead, we do know. And thanks to the absolute stability of artificial matter, we can handle such a condition.

"The thing we are interested in is this: Artificial matter has no tendency to radiate, its electrons have no tendency to fall into the proton, for the matter is created, and remains as it was created. But natural matter does have a tendency to let the electron fall into the proton. A force, the 'lowest energy wall,' over which no electron can jump, caused by the enormous space distortion of the proton's mass and electrical attraction, prevents it. What we want to do is to remove that force, iron it out. Requires inconceivable power to do so in a mass the size of Thett—but then——!

"And here's what will happen: Our wall of protonic material won't be affected by it in the least, because it has no tendency to collapse, as has normal matter, but Thett, beyond the wall, *has* that tendency, and the ray will release the energy of every planetary electron on Thett, and every planetary electron will take with it the energy of one proton. And it will take about one one-hundred-millionth of a second. Thett will disappear in one instantaneous flash of radiation, radiation in the high cosmics!

"Here's the trouble: Thett represents a mass as great as our sun. And our sun can throw off energy at the present rate of one sol for a period of some ten million million years, three and a half million tons of matter a second for ten million years. If all of that went up in *one one-hundred-millionth of a second,* how many sols?" asked Morey.

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* $13 \times 10^{26} = 1{,}300{,}000{,}000{,}000{,}000{,}000{,}000{,}000{,}000$ horsepower.

"Too many, is all I can say. Even this ship couldn't maintain its walls of energy against that!" declared Stel Felso Theu, awed by the thought.

"But that same power would be backing this ship, and helping it to support its wall. We would operate from—half a million miles."

"We will. If we are destroyed—so is Thett, and all the worlds of Thett. Let that flood of energy get loose, and everything within a dozen light years will be destroyed. We will have to warn the Venonians, that their people on nearby worlds may escape in the time before the energy reaches them," said Arcot slowly.

The *Thought* started toward one of the nearer suns, and as it went, Arcot and Morey were busy with the calculators, and they finished their work, and started back from that world, having given their message of warning, with the artificial matter constructors. When they reached Thett, less than a quarter of an hour of Thessian time had passed. But, before they reached Thett, Arcot's viewplates were blinded for an instant as a terrific flood of energy struck the artificial matter protectors, and caused them to flame into defense. Thett's satellite was sending its message of instantaneous destruction. That terrific cosmic ray had reached it, touched it, and left it a shattered, glowing ball of hydrogen. Every other atom on the planet had been destroyed by the cosmic rays.

"There won't be even that left when we get through with Thett!" said Arcot grimly. The apparatus was finished, and once more they were over the now fiery-red lava sea that had been mountains. The fort was still in action. Arcot had cut a sheet of sheer energy now, and as the triple-ray struck it, he knew what would happen. It did. The triple-ray shunted off at an angle of forty-five degrees in the energy field, and spread instantly to a diffused beam of blankness. Arcot's molecular reached out. The lava was instantly black, and mountains of ice were forming over the struggling defenses of the fort. The molecular screen was working.

"I'd like to know how they make tubes that'll stand that, Morey," said Arcot, pointing to an instrument that read .01 millisols. "They have tubes now, that would have wiped us out in minutes, seconds, before this."

The triple-ray snapped off. They were realigning it to hit the ship now, correcting for the shield. Arcot threw out his protonic shield, and retreated to half a million miles, as he had said.

"Here goes." But before even his thoughts could send Thett to radiation, the entire side of the planet blazed suddenly incandescent. Thett was learning what had happened when their ray had wounded the *Thought.*

And then, in the barest instant of time, there was no Thett. There was an instant of intolerable radiation, then momentary blackness, and then the stars were shining where Thett had been. Thett was utterly gone.

But Arcot did not see this. About him there was a tremendous roar, titanic generator-converters that had not so much as hummed under the impact of Thett's greatest weapons, whined and shuddered now. The two enormous generators, the blackness of the protonic shield, and the great artificial matter generator, throwing an inner shield impervious to the cosmics Thett gave off as it vanished, both were whining. And the six smaller machines, which Arcot had succeeded in interconnecting with the protonic generator, were whining too. Space was weirdly distorted, glowing grey about them, the great generators struggling to maintain the various walls of protecting power against the surge of energy as Thett, a world of matter, disintegrated.

But the very energy that fought to destroy those walls was absorbed in defending it, and by that much the attacking energy was lessened. Still, it seemed hours, days that the battle of forces continued.

Then it was over, and the skies were clear once more as Arcot lowered the protonic screen silently. The white sky of Thett was gone, and only the black starriness of space remained.

"It's gone!" gasped Torlos. He had been expecting it—still, the disappearance of a world——

"We will have to do no more. No ships had time to escape, and the risk we run is too great," said Morey slowly. "The escaping energy from that world will destroy the others of this system as completely, and it will probably cause the sun itself to blow up—perhaps to form new planets, and so the process repeats itself. But Venone knows better now, and their criminals will not populate more worlds.

"And we can go—home. To our little dust specks."

"But they're wonderfully welcome dust specks, and utterly important to us, Earthman," reminded Zezdon Afthen.

"Let us go then," said Arcot.

IT was dusk, and the rose tints of the recently-set sun still hung on the clouds that floated like white bits of cotton in the darkening blue of the sky. The dark waters of the little lake, and the shadowy tree-clad hills seemed very beautiful. And there was a little group of buildings down there, and a broad cleared field. On the field rested a shining, slim shape, seventy-five feet long, ten feet in diameter.

But all, the lake, the mountains even, were dwarfed by the silent, glistening ruby of a gigantic machine that settled very, very slowly, and very, very gently downward. It touched the rippled surface of the lake with scarcely a splash, then hung, a quarter submerged in that lake.

Lights were showing in the few windows the huge bulk had, and lights showed now in the buildings on the shore. Through an open door light was streaming, casting silhouettes of two men. And now a tiny door opened in the enormous bulk that occupied the lake, and from it came five figures, that floated up, and away, and toward the cottage.

"Hello, Son. You have been gone long," said Arcot, senior, gravely, as his son landed lightly before him.

"I thought so. Earth has moved in her orbit. More than six months?"

His father smiled a bit wryly. "Yes. Two years and three months. You got caught in another time field and thrown the other way this time?"

"Time and force. Do you know the story yet?"

"Part of it—Venone sent a ship to us within a month of the time you left, and said that all Thett's system had disappeared save for one tremendous gas cloud—mostly hydrogen. Their ships were met by such a blast of cosmic rays as they came toward Thett that the radiation pressure made it almost impossible to advance. There were two distinct waves. One was rather slighter, and was more in the gamma range, so they suspected that two bodies had been directly destroyed, one small one, and one large one were reduced completely to cosmics. Your warning to Sentfenm was taken seriously, and they have vacated all planets near. It was the force field created when you destroyed Thett that threw you forward? Where are the others?"

"Zezdon Afthen and Zezdon Inthel we took home, and dropped in their power suits, without landing. Stel Felso Theu as well. We will visit them later."

(*Continued on page* 279)

The Ant with a Human Soul

By Bob Olsen

Author of "Four-Dimensional Transit," "The Man Who Annexed the Moon," etc.

AN immense amount of research has been done on these amazing little insects called ants, whose instincts seem to approach the frontiers of true intelligence. Asked about the accuracy of the etymology in this story, Bob Olsen replies, in part: "To the best of my knowledge, it is absolutely correct. Most of the facts in my story are universally accepted by myrmecologists. Every incident is supported by at least one authority. Also, for two years there have been three colonies of different species of ants in my garden. At the expense of my rose bushes and other plants, I have permitted them to remain and have spent many hours in watching them with my magnifying glass when I should have been working. . . ." Mr. Olsen generally does know whereof he speaks in his stories, which is one very good reason why they are excellent science fiction.

Illustrations by MOREY

An Undesired Rescue

CHAPTER I

WHEN I recovered consciousness I was still on earth, but in a room totally unfamiliar to me. This was a bewildering surprise, for I had just committed suicide—at least I thought I had—and I expected either complete annihilation or a transference to a much more torrid climate.

A strange man was bending over me. In his hand was a peculiar rubber cap, which I afterward learned was part of a pulmotor. As my eyes flickered open, the man spoke to me in a gentle kindly voice.

"How do you feel?"

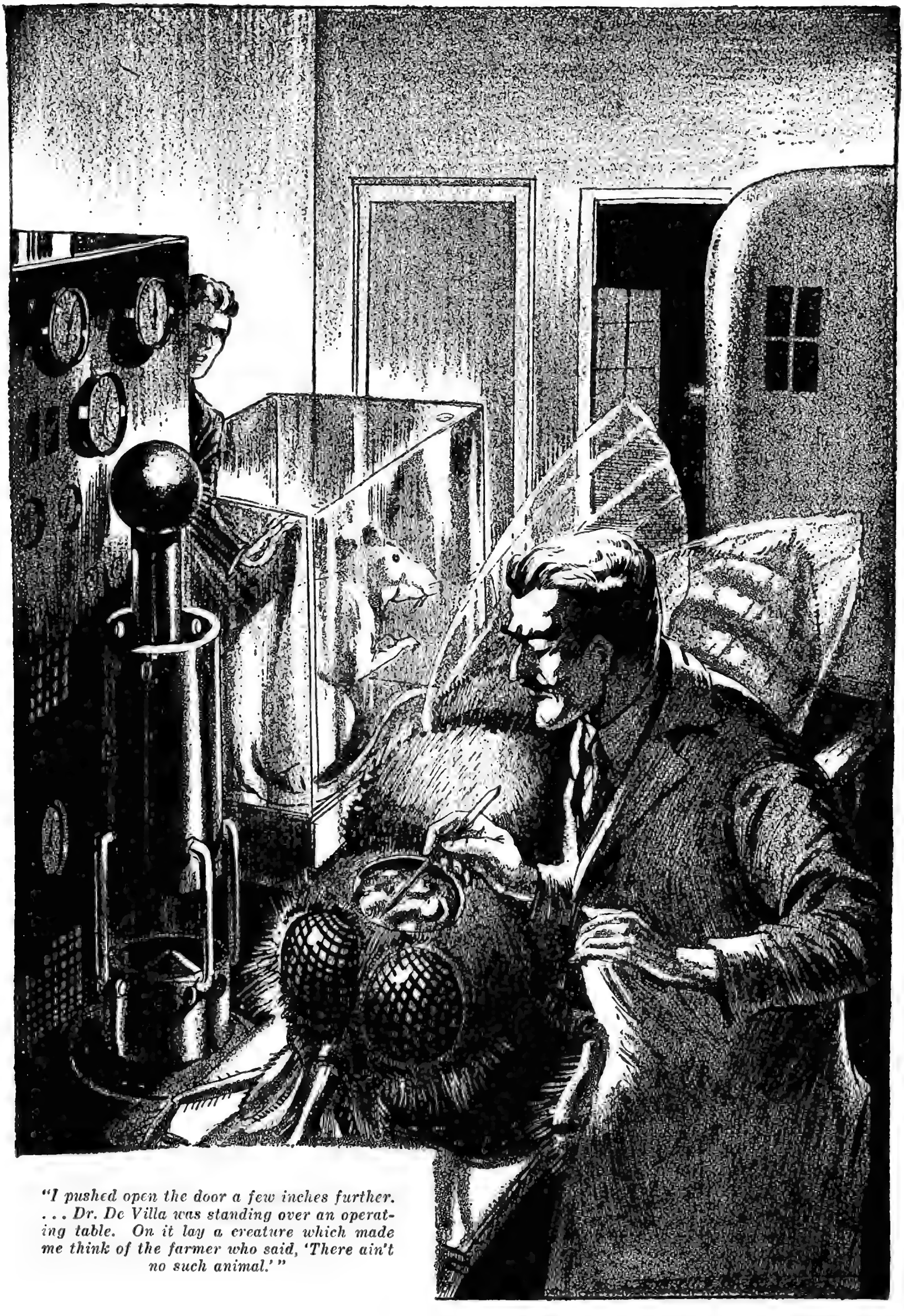
"Rotten!" I told him. That was the best way I could express it. I felt rotten—rotten in body—rotten in mind—rotten in soul. My only desire was to die—to shuffle off the mortal coil which had become unbearable to me; and here I was, through the efforts of some well-meaning but misguided meddler, still alive.

"I am Doctor De Villa," the man informed me. "Don't try to talk. I'll tell you what happened. I saw you jump off the pier and I went in after you. For many weeks I have been awaiting an opportunity like this. Last night my patience was rewarded. I rescued you single handed. It was a tough job. You grabbed me around the neck and nearly succeeded in drowning both of us. Thanks to a cork jacket I was wearing, I managed to get you ashore without assistance. This building is only two blocks from the pier. I carried you here myself. No one else knows about it."

Despite his warning not to talk, I couldn't help protesting, "But I wanted to die. Why didn't you leave me alone. What right have you to interfere?"

"We'll come to that later. I know you did it on purpose, of course. That was the principal reason why I risked my own life to save you without calling for assistance. I have some very definite plans for your future, young man. You'll learn more about them tomorrow. In the meantime you'd better get some rest. You've been through a serious crisis and a good night's sleep will do you more good than anything else. Here, take these two pills. They won't hurt you. Just a harmless sedative."

The doctor stood over me while I placed the pills under my tongue and gulped them down with a swallow of water. Then he sat beside my bed and watched me intently as I pretended to fall asleep. I found that I had set myself a mighty difficult task. Desperately I fought against the powerful drug—striving with all the will power I could muster to keep my mind alert, while at the same time I closed my eyes, relaxed my



"I pushed open the door a few inches further. . . . Dr. De Villa was standing over an operating table. On it lay a creature which made me think of the farmer who said, 'There ain't no such animal.'"

muscles and breathed heavily to make my captor think I was sleeping.

Just as I was about ready to give up the battle, I heard the doctor rise and tip-toe toward the door. The latch clicked. A few seconds later I distinguished a faint whirring sound like the noise made by an iceless refrigerator.

I slipped out of bed. Groping my way cautiously, for the room was dark, I crept toward the door. It did not surprise me to find the door locked, but when I discovered that the knob was a dummy and could not even be turned, I was utterly bewildered. A few moments later, after I had located the switch and turned on the light, I was still more astonished to learn that there was not even a keyhole in the door. Apparently it could be unfastened only from the outside.

Seeking for some other means of escape, I examined the room thoroughly. More surprises. Except for the single door through which I was sure the doctor had made his exit, there was no other opening in the room large enough to allow the passage of a human body. Of windows there were none. Yet the room was well ventilated, thanks to the fresh air admitted through two small, heavily grilled ventilators near the ceiling. It became apparent to me that I was in a secret chamber which was so skilfully hidden in the bowels of an apartment or office building that Sherlock Holmes himself would hardly have suspected its existence.

As I stood there in perplexity with my back to the door, I heard an ominous click behind us. I wheeled suddenly, expecting to see Doctor De Villa enter, but nothing happened. Then I tried the door again and got the biggest surprise of my life. It opened easily.

When I stepped through the opening I found myself in a small clothes closet. Now I was getting somewhere, I thought. It was evident that communication with the outside could be gained through some secret panel in this closet. That ought not to be hard to locate, I reflected, as I fought grimly against the drug, which I could feel tugging my eyelids shut despite all my efforts to keep them open. Finally I had to give in. I managed to switch off the light and stagger to the bed before the sedative won and I fell into a sound slumber.

On awakening, my first thought was to resume the investigation I had started the night before. I turned on the light and softly opened the door. Another surprise greeted me. Hanging in the little closet were the clothes which I had worn when I made my suicidal leap into San Diego Bay. The underwear had been laundered; the shirt was starched and ironed; the coat and trousers were neatly pressed.

Here was an unexpected stroke of luck. Though I was desperate enough to rush out into the street clad only in a suit of oversized pajamas, the prospect of making my escape dressed in a way that would attract no attention was much more pleasant. That I might fail in my attempt to get away did not enter my mind. I took it for granted that I would succeed.

I wasn't quite so confident an hour later, after I had dressed and gone over every square inch of the closet and of the bedroom, without finding the faintest suggestion of a secret panel. However, I did discover one peculiar thing. There was a crack at least a quarter of an inch wide between the floor of the closet and that of the room. This gave me another idea. I entered the closet, closing the door behind me. Working in the skimpy light which filtered under the door, I again explored the walls with my hands. There were several hooks in the closet. I tested each one of them in turn. The fifth hook—or it might have been the sixth one—slid to one side as I grasped it.

There was a whirring sound, like the one I had heard just after the doctor's departure the night before. The floor of the closet shivered and began to descend. This verified my suspicion. The closet was really an elevator. Its starting button was disguised as a clothes hook. Undoubtedly it could also be operated from some place outside.

After moving a few yards, the elevator came to a standstill. With stealthy caution I pushed the door open a tiny crack and peered through the opening.

The room beyond was brilliantly illuminated. I could see only a corner of it, but that was enough to make my eyes pop almost out of their sockets. Imprisoned in a large box with transparent walls was a preposterous animal. In the shape of its pointed snout, its round erect ears, its short legs and its long hairless tail it reminded me of a mouse. But its size was enormous. It must have been as large as a full grown kangaroo. Strangest of all it was really alive. It paced to and fro in the narrow confines of its prison, peering through the glass with its huge, beady eyes, which, despite their abnormal size, still seemed singularly meek and mouselike.

I pushed open the door a few inches further.

What I saw then was more like a horrible nightmare than a scene from real life. Doctor De Villa was bending over an operating table. On it lay a creature which made me think of the farmer who said, "There ain't no such animal."

In coloring, in shape, in physiological characteristics it was exactly like a honey bee; but its size was so stupendous that it left little room to spare when stretched out on the table intended for a full grown man. It must have weighed at least a hundred pounds.

I noticed that the top of the gigantic insect's head had been removed. With a delicate scalpel in one hand and a pair of forceps in the other, Doctor De Villa was performing some sort of operation on the bee's encephalon.

It was then for the first time that I noticed the sinister appearance of the man who had fished me out of San Diego Bay. He was tall—so tall that his well-muscled frame gave the deceptive impression of undue slenderness. His face was turned so that I saw it in profile. It seemed as clear cut as a cameo, against the sable blackness of a velvet curtain a few feet behind him. His hair was parted in the middle and was combed back in a way that gave a peculiar illusion of two hornlike formations protruding from his head. The heavy eyebrows, sloping upward at a rakish angle, the aquiline nose, the pointed chin, the lips, parted in a sardonic, mirthless smile, and the small moustache all suggested some familiar person whose picture I had often seen but couldn't quite place. The illusion was heightened by a weird, ruddy glow which was cast over his features by a light originating in a grotesque piece of apparatus nearby. The same light transformed the laboratory frock which the scientist was wearing into a blood-red cape.

As soon as I could tear my eyes away from this fascinating spectacle, I glanced around the visible parts of the room in search of an exit through which I could make my escape.

Behind and beyond the doctor I saw a door. To reach it I would have to pass close to the laboring scientist, but I felt confident I could accomplish this—particularly since he seemed so engrossed in his work that his attention would not easily be distracted.

Fortunately for me the floor of the room was covered with heavy linoleum. With bated breath and stealthy step I tiptoed across the room. When I was directly behind my captor I was startled to bear him speak. Without interrupting his grewsome task, without even turning his head he remarked in a conventional tone of voice, "Good morning, Mr. Williams. Did you sleep well?"

My only answer was a sudden dash to the door. Much to my disappointment, I found it locked. Panic stricken, I seized a small metal laboratory chair and, using it as a battering ram, tried to break down the barrier.

In two long strides, Doctor De Villa was beside me. He wrenched the chair out of my hands, as easily as if I had been a baby. Wild with fear and anger, I struck at him. With his left hand he seized my coat in the region just above the top button. When he tightened his grip I could sense that the fabric of the woolen garment was stretched over my back almost to the bursting point.

IN vain I tried to land a blow on his jaw or to reach his shins with the toe of my heavy shoe. His reach was so long and his hold so powerful that all my frenzied efforts to punish him or to break his grip were futile. Due to the strenuousness of my struggles I became bathed in perspiration. The blood vessels in my face seemed ready to burst. I was soon panting from the terrific exertion.

The uneven contest seemed to have little effect on Doctor De Villa, however. He was just as cool and calm and unruffled as if he had just completed dressing after a brisk shower bath.

In a clear voice in which all semblance of excitement, anger or even resentment were lacking, he said, "Don't you think, young man, that the most sensible thing for you to do is to calm down and talk this matter over with me in a reasonable way? I have no desire to harm you. If you will only listen to what I have to say to you, you will soon realize how silly you are to behave like this. By doing as I suggest, you have everything to gain and nothing to lose."

As soon as the first flurry of my anger had subsided, I began to realize that the doctor was right. I *had* been silly. I *was* acting in a very unreasonable and senseless manner.

"All right!" I gasped. "I quit. Sorry I made such a fuss."

He released his grip on me.

Just then a frightful sound came to my ears. It was a deafening buzz. Like the deepest tones of a large pipe organ it whipped the air of the room into ominous vibrations.

Doctor De Villa made a frantic dash for the operating table, but he was too late. The colossal insect, which apparently had been under the influence of an anesthetic, had regained consciousness and had quickly severed the frail bonds which held it to the table.

Maddened by pain, it had taken flight.

It was a terrifying sight, as it winged drunkenly about the room. I could plainly see the throbbing, exposed brain of the horrible creature. In its great eyes, as large as dinner plates, I fancied I could read a host of human emotions: Agony, fear, revenge, the desire to kill—all seemed clearly reflected in those terrible eyes.

As the monster headed in my direction, Dr. De Villa uttered a warning cry, "Careful. Don't make a sound. Stay right where you are without moving a muscle and it won't hurt you."

He might as well have asked me to remain standing on top of a red hot stove without uttering a sound or moving a muscle.

An involuntary cry of fright burst from my lips. Waving my arms in an ineffectual effort to frighten the creature, I backed away from it. Of course it was the worst thing to do, but I couldn't help it. My body seemed to act mechanically, paying no attention to the brain which tried to keep it in control.

I had supplied the monster with what it had been searching for—a victim on which to vent its murderous anger. Straight for me it hurtled, striking me full in the chest and sending me crashing to the floor.

It was just about to sink its deadly sting into my body when Doctor De Villa seized the insect in both his hands and tore it away from my prostrated form. The bee put up a terrific struggle but De Villa held it in such a way that it could not use either its legs or its sting on him.

"Quick!" he yelled to me. "Get the can of ether and the large cone from the table there. That's it. Hold the cone so it will completely cover the bee's head. Now pour some of the ether on it."

In a few seconds the insect had ceased its struggles.

"I may as well kill it," the doctor remarked calmly. "There's not much use to continue with my experiment now. The creature will probably die after all that excitement, so there's nothing to do but put it out of its misery."

When he had disposed of the bee, I extended my hand to him. He grasped it warmly as I said, "Thanks, Doctor. I guess you saved my life."

"Yes? You realize that, do you? For the second time in less than twenty-four hours, I have saved your life. Both times you tried to throw that life away. Don't you think that by this time I have a right to decide—at least in a measure—what is to be done with that life?"

As he spoke these words he was standing directly in front of the singular piece of apparatus from which the powerful beam of blood-red light emanated. Looking at him now at close range the illusion of weirdness was even more cogent than it had been before.

I observed that his hair was parted precisely in the middle and was combed back in a peculiar fashion suggesting horns. His piercing eyes, his slanting brows, his pointed chin and the sardonic smile on his lips filled me with a strange uneasiness.

Suddenly the mystic switchboard of my brain made the connection I had been seeking and I thought I recognized him.

"Say!" I gasped. "Now I know who you are. Your name is De Villa, all right—with the two last letters omitted. You are the devil—that's who you are and you saved my life so you could steal my soul!"

This seemed to amuse him immensely. He laughed. It was a hearty, wholesome, honest laugh—not at all the sort of a laugh I would expect to hear from his Satanic majesty. He turned a switch and the mysterious red light was extinguished.

Instantly the remarkable illusion vanished. All I could see then was an ordinary human being. He was exceptionally tall, to be sure, and his features were somewhat unusual, but everything that suggested to my excited mind the presence of the evil one had disappeared.

"So you think I'm Mephistopheles?" the Doctor chuckled. "You are afraid I've picked you out to be my Faust? That's the funniest thing I've heard in a long time." And he abandoned himself to another spasm of laughter.

When he had recovered himself enough to speak again he went on, "Much as I would enjoy playing a rôle like that, I'm afraid I can't qualify. I have no supernatural powers. I cannot promise to fulfill all your desires. What you may be pleased to call your soul does not concern me in the least. However, I *am* interested in your body; and I am willing to make a bargain with you for the temporary use of it."

"What do you mean?" I gasped.

"It's a long story. Too long to listen to on an empty stomach. You haven't had your breakfast. Neither have I had mine. Though I've been up and at work for several hours, I purposely postponed eating so that I could enjoy your company at the table."

"That's mighty thoughtful of you." These words were spoken in full sincerity but I am afraid that the unsettled condition of my nerves made my polite phrase sound sarcastic.

CHAPTER II

The Threat

I EXPECTED him to produce a key and unlock the door, but instead he stood several paces away from it and whistled a note which sounded like the call of a whip-poor-will. Noiselessly, the door swung open.

"Your servant seems to be right on the job," said I.

"Servant?" he questioned.

"Why, yes. Wasn't the door pushed open by someone in the adjoining room who heard your whistle?"

"The door was opened by a servant all right. But not by a human one. It's a purely mechanical device operating on the same principle as the televox. Except for you and me there are no other human beings in this apartment. I always work alone. It is the safest and the surest way."

He stepped aside, motioning for me to pass through the door. The room which I entered was a large one, sumptuously furnished as a living room.

"Here is our kitchen," he remarked, indicating a swinging door. "If you'll excuse me, I'll prepare our breakfast."

"You don't mean to tell me that you are the cook," I exclaimed.

"I'll let you decide that after you have sampled a meal prepared by my hands. I can assure you that I have had plenty of experience. Without intending to seem egotistic, I believe I could qualify as a cook."

"Mind if I wait here?" I asked.

"Certainly not. Make yourself comfortable. You'll find cigarettes on that table and there are plenty of books and magazines over there. But you won't have much time for reading. I'll have breakfast ready in a jiffy. The menu is bacon and eggs. Is that satisfactory to you?"

"Quite," I assured him. "But if you don't mind I'd like my eggs scrambled."

I waited until I heard the cozy bubbling of the coffee percolator and smelled the delightful odor of frying bacon. Then I strode to the window and parted the heavy velvet curtains. I found myself looking out upon San Diego Bay, which was but a few hundred feet away. From my elevation I estimated that I was on the third floor of an apartment building.

The casement was built right into the wall. There seemed to be no way of opening the window. It was also guarded with a heavy grill of hand-wrought iron.

As I gazed out on the bay, I observed that something unusual was happening that morning. At least a dozen row-boats, motor boats and other small craft were hovering about the steamship pier. On the dock itself a crowd of curious spectators had collected.

As I watched this puzzling scene, I was startled to hear the doctor's voice almost in my very ear: "Interesting, isn't it? Of course, you know what they are doing?"

"I haven't the slightest idea."

"They are hunting—or perhaps I should say fishing—for you."

"For me?"

"Yes. For you. There's a full account of your death by suicide in the "Morning Union." You can read all about it while we eat. Come on, Mr. Williams. Breakfast is served."

"That bacon sure smells good," I remarked as I sat down in the breakfast nook.

"Yes?" He eyed me quizzically. "And to think that just a few hours ago you tried to project yourself into a place where you'd never be able to enjoy fried bacon again. After all, it's a lot nicer to be sitting here eating bacon and eggs, than to be bumping around on the bottom of the Bay out there. Don't you think so, Mr. Kenneth Williams?"

"How did you find out my name?" My question was asked merely to make conversation.

This the doctor seemed to realize, for he didn't take the trouble to answer my query. Instead he went on to say, "I can't tell you how pleased I was when I read the slightly exaggerated account of your suicide in the "Union" this morning. I feel like a man who went fishing for perch and caught a ten-pound salmon."

"I suppose that is meant as a compliment, but I'm afraid I don't get you," was my response.

"Then permit me to explain. According to the newspaper account, you are an orphan. You have no close relatives who are now living. That's correct, is it not?"

"Sure! What of it?"

"Nothing in particular except that it simplifies matters immensely. There is no one to consider except you. That is an advantage, of course. But the thing that delighted me most was the account of your training—the work you have already done along scientific lines. I hardly expected anything like that when I fished you out of the Bay; but it happens to fit in admirably with my plans. In fact, had I been able to make a selection from among all the young men in Southern California, I don't believe I could have found a person better qualified than you are."

At this point I interrupted him. "Excuse me, Doctor De Villa, but what you are saying is all ticker-tape to me. Would you mind putting me wise—giving me a faint idea of what you are driving at."

"Very well, then. I want you to help me perform an unsual experiment—an experiment which may sound preposterous to you but which I am certain will succeed. It will bring world-wide fame to me and I hope to you as well. If you will give me this assistance willingly, I on my part will agree to reward you very generously."

"But suppose I am not willing?" I challenged.

"In that case, I should have to compel you to help me—even against your will. I'd much prefer a voluntary submission on your part, because, then, our experiment would be bound to be more successful and more resultful. But in case you are foolish enough to refuse, I am prepared to persuade you by means of force."

"So that's what you are," I exclaimed hotly. "A body-snatcher! You think it is perfectly all right to kidnap me and to force me to do something I don't want to do."

"You seem to forget that I have some claim on your body and your life. What you threw away I recovered. For that reason I sincerely feel that your life belongs to me to do with as I see fit." He said this in a grim tone, looking me straight in the eye, with an intensity that made me shudder.

I SHOOK my eyes free from his hypnotic stare and tried to pretend I wasn't frightened. "Don't kid yourself," I snarled. "You can't get away with stuff like that right here in the very heart of San Diego. I'll find some way to get word to the police. They'll search for me and find me here. Then it will be the big house for Doctor De Villa."

"I wouldn't count too much on that if I were you. If you knew me better you would understand that I am not in the habit of bungling a matter like this. Naturally I have taken extraordinary precautions to prevent you from communicating with the outside and to avoid any possibility of your being found here. The police are already searching for you; but there is only one place they will think of looking, and that is in the waters of San Diego Bay. The note you left in your room and the hat which was found on the pier made your suicide so obvious that no one would think of any other possibility."

My only answer was a surly grunt. It was plain to me now that I was in the power of this man. There was nothing to be accomplished by antagonizing him.

Doctor De Villa continued, in a tone that was surprisingly gentle and friendly, "I'm afraid I've spoiled your enjoyment of your breakfast by getting you into this verbal battle. Please forgive me. I didn't intend to make you uncomfortable. On the contrary, I'd like very much to help you if you will let me. Why can't we be friends?"

"Friends?" I scoffed. "That's a funny word to use with a man whom you have threatened as you have me."

"I didn't mean to threaten you. My only desire is to make your position clear to you. And now the thing I'd like to do most is to find some way of helping you. I wish you would confide in me. Before you reach the point of trying to take your own life you must have gone through a period of intense suffering. Your life has become so tangled that you can't see any other way out except suicide. But perhaps I, with my wide experience and knowledge, can straighten things out for you."

"To straighten out my life you'd have to be a combination of Houdini and Freud," I said bitterly.

"Suppose you tell me about it," he coaxed. "According to the accounts in the newspapers no one seems to understand why you decided to commit suicide. Your note gave no explanation. What was the trouble? If it was money, I can——"

"No," I cut in. "It wasn't money."

"Then perhaps it was a woman."

"Not that either," I denied. "Oh, I guess a girl had something to do with making me realize what a mess my life was; but she wasn't the fundamental cause of it."

"Then what was it?"

"Religion!"

"Religion?" The pitch of his exclamation showed that even De Villa, who seemed so cock-sure of his knowledge of human psychology, was astonished at this declaration.

"Yes, religion," I rejoined. "Or rather, the loss of my religion. That's what made me desperate. That's what forced me to try to end my life."

"Please tell me about it," he said quietly.

"There's really not much to it. Before I went to college I was extremely religious. So strong was I in my belief that I would have sworn on a mountain of Bibles that nothing could ever shake my faith. When I entered the university I became interested in science and philosophy. I was shocked to learn that most of my professors were not Christians. A lot of the things they taught me wouldn't jibe with my theological dogmas. This bothered me. When I took my perplexities to the minister of my church his only answer was, 'You must have faith to believe what you read in the Bible even if it does seem contrary to the so-called facts of science.' You see, my religious teachers know nothing of science and my science teachers can't see anything in religion. The scientists say, 'What we tell you can be proved to be true.' And the religious men tell me that their teachings do not require any proof. I must accept them on faith."

I paused a moment. De Villa urged me to continue.

"Ever since I can remember, my belief in Christianity and in the Bible has been my chief source of guidance. When that was shattered I was like a ship without a rudder. I was tossed around in a sea of uncertainty. I was at the mercy of every passing gale of opinion. I had lost the one thing that made life worth living."

"You said there was a girl," he reminded me.

"Yes, there *was* a girl is right. Her name is Alice Hill. But she didn't have much to do with it, except that when I lost my religion I also lost her. I was foolish enough to discuss the matter with her and to tell her I had lost faith in the things that seemed so clear to her. We had arguments—foolish, futile arguments—utterly senseless because there was no common ground on which we could meet mentally. She was shocked at the change in me. I don't blame her for becoming disgusted with me and refusing to see me any more."

"And because of that you decided to end it all?"

De Villa's manner as he said this reminded me of the way my mother talked to me one day when I ran away from home, forever—and stayed out until nine-thirty in the evening.

"Young man," he added sternly. "The trouble with you is that you have been sick. It's fortunate for you that I found you, because I know how to cure you. Some day you are going to thank me from the bottom of your heart."

"Then you really think you can straighten me out," I cried eagerly.

"I'm sure of it. Strange as it may seem, the very thing I have planned for you, ought to help substantially in speeding up your recovery."

"But just what have you planned for me. Here we have been talking for nearly an hour and still I haven't the faintest idea of what you are driving at. I think you will realize that under the present circumstances your delay in coming to the point is somewhat exasperating."

"I'm sorry. Nevertheless, I'll have to run the risk of exasperating you a bit more by asking you if you'd like another cup of coffee."

"No thanks. Though the coffee is very good I have had plenty. I enjoyed the breakfast very much. I thank you. And now will you *please* come to the point.

"With pleasure. But let's go back to the laboratory. There are some things there I want to show you. I'll need them to make my explanation clear to you."

CHAPTER III

A Startling Proposal

WHEN I was seated on one of the metal chairs in the laboratory, Doctor De Villa picked up the thread of our conversation.

"In order not to continue keeping you in suspense, I shall outline my plans very briefly. After that I shall supply whatever details seem pertinent and answer any questions you wish to ask me.

"In the first place let me explain that I have invented a device with which I can either increase or decrease the size of any object without changing any of its other properties. When I say *any* object I mean to include not only inanimate objects, but also all living things, such as plants and animals. It will work even with insects and germs. To save time I'll postpone an explanation of the principle of my machine until later. Suppose for the time being you accept the possibility that I can cause a small insect, such as an ant, to increase in size until it is as large as a man. I can then make any changes in it that I desire and can subsequently restore it to its original size. Is that clear?"

"Sure! But what's that got to do with——"

"Pardon me for interrupting. If you'll be good enough to listen for just one moment more, you'll find out what this has to do with you.

"I think you can realize how important my discovery is in the study of insect psychology. Hitherto our knowledge of mental processes of bugs has been seriously hampered by the small size of their brains. Practically all we know about insects has been derived from observation of their behavior. It hasn't been possible to do very much experimentation to determine the relation. between certain parts of the brain and the various senses and instincts, such as have been performed on larger animals, including human beings.

"By magnifying the size of insects, I have succeeded in performing a number of very interesting and illuminating experiments. The bee which attacked you in this room a short time ago was one of my many subjects. In that particular case I was transplanting the brain of a dog into the encephalon of the bee.

"Through a series of similar experiments I have definitely established the fact that ants possess strong memories. I have also located the portion of the ant's brain in which the faculty of memory is located. All this has paved the way for the greatest experiment of all—an experiment which will bring me undying fame. And that's where you come in.

"My plan is simply this: I shall place you under an anesthetic and shall perform an operation on your head, removing that portion of your brain which is the seat of your memory. This I shall transplant into the brain of an ant, which I have previously expanded to a volume corresponding to yours. Then I shall restore the ant to its natural size and shall permit it to return to its nest and resume its regular activities. My belief is that you will be thoroughly cognizant of everything that happens to that ant. You will not only be able to observe everything that goes on around the ant but you will also obtain a clear idea of what occurs inside the ant's brain. Later on, I shall capture the ant and shall increase its size once more. After restoring the borrowed brain segment to you, I shall bring you back to consciousness. You will then be able to describe the mental reactions of an ant both objectively and subjectively. What do you think of the idea?"

"Horrible!" I exclaimed. "Unspeakably horrible."

"I'm sorry you feel that way about it."

"Why shouldn't I? What's the good of it? Suppose I do go through with this. Suppose your extremely optimistic ideas about it are justified and the experiment is successful, what practical benefit will you or any one else derive from it?"

"If by practical benefit you mean something from which money can be made, I'll have to answer that this experiment will have no value that is practical in that sense. But in another sense, the work will be of immense value. It ought to accomplish something than which there is nothing more important in human history."

"And what is that?"

"Adding to the store of human knowledge. Surely, with the training you have had in science, it is not necessary for me to convince you that anything that will increase knowledge is extremely worthwhile. To accomplish less than this, thousands of really big men have sacrificed their lives.

"But suppose for the present we ignore the effect of of this experiment on human progress. Let's regard it from your own selfish standpoint. Let's consider what it will do for *you.*

"According to your own admission, your life has been a failure. You were ready to throw it away. Do you know the real reason for this? You hinted at it when you said you were like a ship without a rudder. You not only lack a steering mechanism but you also lack a destination. You have no purpose—that's why you were ready to give up so quickly. Here's your chance to acquire a purpose—a real purpose—the most important and significant purpose you could possibly have. That's all you need to make you well and to untangle your life—a purpose and the will to accomplish it."

"Perhaps there is some truth in that," I admitted. "But I did have a purpose. You thwarted it."

"You mean your purpose to destroy yourself, I presume. All right, then. Suppose we consider the matter solely from that angle. You want to have done with living. But what's the use of throwing away, just because you don't want it yourself, something that is valuable to someone else? Wouldn't it be more sensible and more sporting to give it away or even to sell it?"

"I don't believe I get you," was my response to this suggestion.

He replied by asking me a question: "Do you still want to die?"

"I sure do. Nothing has happened to make me change my mind."

"And suppose I permitted you to leave this apartment. Suppose I turned you loose. Would you attempt suicide again?"

"Certainly. Why not?"

"All I can say is that I am gravely disappointed. I had hoped that you would be influenced by what I have said to you. However, even if you persist in this unreasonable and insane obsession of yours, you will still be better off if you give or sell your life to me."

"What advantage could I possibly gain by selling my life? I can't take the purchase money with me, can I?"

"No, but you can present it to some dear friend of yours—Alice Hill, for instance; or you can donate it to some worthy charity."

"What good will that do me?"

My companion shook his head.

"You certainly are a sick man. I feel sorry for you. 'What good will that do me?' you ask. What a selfish, asinine question! Have you completely lost all sense of decency and of your obligations to your fellow men? If you insist on dying, isn't it better to die in a way that will benefit somebody? A little while ago I said I was fortunate in having found you. Now I'm beginning to wonder if I wasn't grievously mistaken. You're the most unreasonable person I've ever been associated with."

I enjoyed his discomfiture. With an insolent grin I taunted him: "You seem to have changed your tune, doctor. A while ago you informed me that you would carry on the experiment whether I consented or not. If that's the case, why take so much trouble trying to gain my consent?"

"Because I want to help you. I am sure that this experience will straighten your mind out. Another reason is that the experiment will accomplish a great deal more, if I have your willing cooperation, than if I force you into it."

"You intimated a moment ago that you would like to buy my life. Am I to infer that you are willing to pay a considerable sum for my cooperation?"

"Precisely. Your cooperation is worth ten thousand dollars to me. If you wish, I shall place that sum to your credit so that you can use it yourself after the experiment. For instance, it may make a nice little nest egg for you and Alice, after you have straightened yourself out. If you wish, you may send the money to anyone you desire before you submit to the experiment; or you can leave instructions with me as to how to dispose of the money in case anything happens to you.

You may depend on it that your wishes will be carried out."

"You think, then, that the mission you have chosen for me will be dangerous."

"NATURALLY there will be some risks. But I shall take extra precautions to reduce these hazards to the minimum. On the other hand I can promise you that your life among the ants will be anything but tiresome. It will be crammed full of exciting and fascinating experiences. There will be enough adventure and interesting events to keep you from thinking about suicide. And, after the experiments are finished, if you still are in the same frame of mind, there will be nothing to prevent you from carrying out your intentions. In fact, I shall then be glad to help you make a good job of it."

"But how about yourself?" I asked. "If we do go through with this, isn't it likely to prove rather risky for you?"

"I can't see that there would be any risks worth considering. Even if there were, I'd gladly assume them for the sake of science."

"Do you mean to say that you'd be willing to hang for the sake of science?"

"I might. But what's the use of introducing such an impossible conjecture?"

"What makes you think it impossible. Let's suppose that the experiment is a failure. Suppose I should die on your hands. You'd still be encumbered with what lawyers call my *corpus delicti,* wouldn't you?"

"That doesn't worry me in the least. There are a thousand ways in which I could get rid of your body. Perhaps the simplest way would be to put you back where I found you—in the waters of the Bay. It would be an easy matter to make your head look as if it had been battered against the piles of the pier. When the searchers out there found your body it would merely form a logical conclusion to the chapter which you began when you wrote your farewell note and left your hat on the dock."

"I see you have it all figured out."

"Oh, yes. Yes, indeed. I always plan my work very carefully in advance, making suitable provisions for every possible contingency. That's why I never make any mistakes or commit any blunders."

"Then I certainly hope your record for one hundred percent efficiency is not broken while you are working on me."

"Does that mean you are ready to give your consent?" he cried eagerly.

I evaded a direct answer to his question.

"You said something about adventure a moment ago. As I remember it you promised that my life among the ants will be crammed full of exciting and fascinating experiences. Frankly, I don't see how the life of an ant could be at all interesting. I've watched the little beggars at their work. They seem to be continually rushing back and forth like a bunch of Sunday motorists who are in a terrific hurry to get nowhere and do nothing."

"If that's the impression you obtained from watching ants, I'm afraid your observations have been very superficial. Scientists who have devoted years to the study of ants have certainly not found them dull or uninteresting. It may surprise you to learn that most authorities believe that the activities of ants come closer to those of human beings than those of any other creatures do."

"How about the anthropoid apes? I thought it was generally conceded that they are more like men than any other animals."

"Looking at the matter from a purely morphological standpoint, that, of course, is true. But from the standpoint of behavior—of social activities, mental development, constructive intelligence and similar 'human' traits, the ant is far ahead of the ape in development.

"Let me give you an example: In certain tropical countries there are vast armies of so-called 'driver ants.' They travel across the country in serried ranks, like well disciplined soldiers. They have their leaders, their scouts and their intelligence corps. They search out caterpillars, spiders and other bugs, attacking them, killing them and tearing them to pieces. Small animals like mice and snakes fall an easy prey to these vandals. Even animals as large as sheep or cows, when tethered so that they cannot escape, have been destroyed by driver ants, who strip every particle of flesh and gristle from their bones. No doubt you have heard of men being tortured and killed by leaving them bound on top of an ant hill.

"Strange as it may seem, however, there are places where these foraging ants are regarded as friends of men. They make periodic invasions into human habitations, devouring or driving out all the vermin such as cockroaches, spiders and rats which infest the roofs and walls of tropical homes. The natives call them 'ants of visitation' and welcome the semi-annual housecleaning which they give to their homes. The ants stay only long enough to do a thorough job of de-verminizing a house—then they move on to the next building."

He paused.

"That's all very interesting," I remarked. "Of course I've heard about driver ants, but I had no idea that they were so intelligent as your account seems to indicate. Was your idea to enlist me in an army of ants like that? If it is, I don't believe I'd care for the job.

"I wouldn't mind the sheep and the cows, but I'm afraid the spiders and the snakes wouldn't agree with me at all. And as for caterpillars! I remember once when I was a bit of a lad I tried to eat a caterpillar. It was so hairy and so wiggley that I didn't enjoy it at all—in fact I had to spit it out before I had consumed half of it."

The Doctor looked at me out of the corner of his eye as if he didn't know whether to laugh or take me seriously. He compromised by ignoring my attempts at being facetious.

"I had no intention of putting you into a colony of driver ants," he said solemnly. "I merely mentioned them because they furnish familiar examples of the social activities of ants. There are other species of the insects which are far more manlike than the army ants. For years I have kept several ant colonies of different species under close observation. I intend to use them in our experiments."

"How many different kinds of ants are there?" I inquired. "About a dozen?"

"A great many dozen. In fact six thousand different species of ants have been described so far by scientists. Even this large list is by no means complete. I wouldn't be surprised if, after the job of classifying ants has been performed thoroughly, it will transpire that there are at least ten thousand different species."

Doctor De Villa had been speaking in an academic tone—like a professor lecturing to a class of students. Now he became more personal:

"You seem to be getting interested in our little insect friends, Mr. Williams. Does that indicate a decision favorable to my plans?"

"Not necessarily," I hastened to hedge. "I'll have to admit, though, that your promise of adventure interests me. That's one thing which has been missing from my drab life. I've always yearned for excitement and perilous adventure and I've never had a chance to gratify my yen. Perhaps that *is* what's wrong with me.

My existence has been so commonplace that I'm sick and tired of the monotony."

De Villa, with the instinct of a master salesman, seized eagerly at the opportunity which my admission opened up.

"You are absolutely right! What you need more than anything else in the world is adventure! And can you think of any human experience that could be anywhere nearly as exciting and interesting as to live for a while in a colony of ants, participating in their battles, their labors and their sports?"

"Sports?" I gasped. "Do you mean to tell me that ants engage in sports?"

"They certainly do. Ants have their athletic contests and their organized games, just as we do. But I'd rather not give you any of the details. It will be much better, both from the standpoint of your enjoyment and the results of our experiments, if you experience these things without being confused by any preconceived notions. However, I want to reiterate what I said before. You may be absolutely sure that your life among the ants will be crammed full of adventure and interesting experiences. Won't you just accept my word for this and tell me right now that you are willing to cooperate with me?"

"Do I have to decide right now?" I procrastinated.

"Not at all. Take as much time as you wish. Naturally, after having progressed this far, I'm eager to go ahead. But perhaps it will be just as well if you defer your decision until you know more about the scientific discoveries which will make it possible for me to transfer your consciousness and memory-faculties into the body of an ant. Would you care to hear about them now?"

"Sure! Fire away!"

CHAPTER IV

The Mysterious Force

DOCTOR DE VILLA led me to a fantastic mechanism near one corner of the room. The most prominent feature of the device was a chamber shaped like a large bathtub turned upside down. It was built of steel and was provided with four large glass windows, one at the curved end, one at the top and one at each side. I estimated that it was about eight feet long, three feet wide and four feet high. The flat end was open but was equipped with a semicircular door of steel which was hinged at the bottom and could be closed hermetically by means of six strong bolts with wing nuts. Surrounding this peculiar contrivance was a bewildering array of coils, tubes, levers and dials.

"This is what I call my Volumalter," the doctor announced. "I'm sorry I can't explain all the details of the mechanism to you. For one thing, it's pretty complicated—even for a man of your scientific training to understand. Another reason is that I haven't had it patented yet, and I can't take chances of having the idea stolen." As he said this there was a twinkle in his eyes which told me he was kidding.

"I can tell you this much though," he continued. "My machine makes use of a brand new kind of energy which is utterly different from any other kind which has hitherto been discovered. Perhaps I can make it a trifle clearer by using two analogies. You know that inanimate objects may be made to expand by the application of heat. Of course the amount of expansion which can be produced in this way is relatively small. I mention it merely as an illustration of expansion produced by the application of force—in this case the force of heat. The usual explanation of this phenomenon is that the increase in temperature causes increased molecular activity, which also brings about the increase in size.

"Another example of expansion is illustrated by the sponge. When dry its volume shrinks enormously but when the pores are filled with water or some similar liquid, the volume of the sponge is increased considerably.

"Please don't get the idea that the system I use is directly analogous to the methods illustrated by the heated iron or the soaked sponge. At the same time there is a faint similarity between my process and the last named method.

"You probably know that all objects—including insects, men and other animals, are porous. They are made up of particles of matter which do not touch each other but are separated from each other by space. In searching for a way to make things larger without destroying their characteristics, my task was simply to find some way to make the particles of matter move further away from each other, thus increasing the volume of the spaces between the molecules.

"After years of patient research I discovered a marvelous substance. It is neither a solid, a liquid nor a gas. In most of its properties it is like a very tenuous gas but it resembles a liquid in that it is held together by a very powerful cohesive force and it resists efforts to compress it. I call this substance SPACITE. The Volumalter includes a mechanism for generating Spacite and for forcing it into the pores of objects. It also contains a device for drawing the Spacite out of an object which has become impregnated with it. But I suppose the best way to make the system clear to you is to give you a practical demonstration."

He stepped to a cabinet and took down a glass beaker which was half full of earth.

"Since we are interested primarily in ants, I'll start with one of these industrious creatures. I took some of them away from their home yesterday. They belong to the genus *atta,* commonly known as the leaf cutting ants."

While he was talking, he poked around in the beaker with a pair of tweezers. He finally captured one of the insects and placed it inside the vaulted chamber of the Volumalter. Then he closed the door, clamping it firmly in place with the wing nuts.

"Can you see it in there?" he asked, indicating one of the side windows.

I peered through the glass and was just barely able to distinguish the tiny creature which looked utterly incongruous as it scampered about what to it was an enormously large room.

"Aren't you going to tie it up so it will stay put," I asked.

"No," he replied. "That isn't necessary. The stuff works exactly the same whether it moves around or remains perfectly still. See if you can keep your eye on the ant. Watch what happens to it when I turn on the power."

He threw in a switch, opened a valve and adjusted one of the dials. From the interior of the machine came a low, droning hum.

I expected to see the ant stop suddenly, but it didn't give the slightest indication that anything unusual was happening to it. For an instant I took my eyes away from the ant and looked at the doctor, but he was too much occupied with the controls of the machine to pay any attention to me. When I glanced back I was surprised to see that the ant had already expanded until it was fully five inches long. In open-mouthed astonishment I watched the creature as it grew larger and larger. It was almost as if the living insect was a hollow rubber balloon which was being inflated right in front of my eyes.

Soon it had become so large that it could no longer scamper around. Instead it paced back and forth, like a lion in a narrow cage. Still it continued to grow until it was so large that it had only room enough to move a few inches in each direction. Then the inventor of the device operated the controls again and the expansion process ceased.

For the first time since he had started the machine, De Villa spoke:

"There you are. You get the idea now, don't you? The brain of that ant is now approximately the same size as yours. It will be a simple matter to make a transfer of memory faculties. What do you think of it?"

Strange to say, I was more interested in the appearance of the insect than in the miracle I had just witnessed.

"Ugly beast, isn't it?" I said with a shudder.

"Do you think so? To me it is beautiful. Notice the symmetry of its body, the perfect co-ordination of the six legs, the splendor of its coloring and the efficiency of its mandibles."

"It's well armed, all right. Gosh, but I'd hate to get nipped by that baby. But it must feel funny, all blown up like that."

"On the contrary, I doubt if it has noticed any difference in itself. The only change it has observed has been in its surroundings. It thinks that the chamber in which it is confined has diminished in size—that's all."

"Will it keep on living if you take it out of there?"

"Certainly. Let me show you."

"Never mind. I'll take your word for it. If you let that monster out, it might take a notion to chew my head off."

"You don't need to be afraid of anything like that. I'll just anesthetize it for a minute and transfer it to one of my glass cages. Do you see this valve over here? It controls the ventilation inside the chamber. Right now I am supplying the ant with just the right amount of pure air. When I turn this the air current is replaced by a supply of nitrous oxide, which as you know is the 'laughing gas' which dentists use. Now watch what happens."

I watched. The insect, which had been moving forward and backward in the narrow confines of its prison, suddenly stopped and cocked its head to one side as if to listen. Then one of its legs seemed to give way and it began to stagger. A moment later it was lying motionless on its side.

The doctor turned the valve again, waited for a few seconds and then opened the door at the end of the device.

"Give me a hand, will you?" he said to me. "I can lift it alone, of course, but it's a little bit easier for two to carry it."

I WAS surprised to notice how heavy the creature was and I made a mental note to ask De Villa about it as soon as we had put the ant in a place of safety. We carried the inert body to a cage right next to the one in which the giant mouse was imprisoned. The inventor stepped on a small lever and the front of the cage swung open. We deposited the insect in the receptacle and closed the door. Glancing at an indicator connected with the cage, Doctor De Villa adjusted a valve and remarked, "I'll give it an extra shot of oxygen to bring it back quickly."

As he spoke, I saw one of the insect's legs twitch. A few minutes later it was running around in the cage as if nothing had happened.

"It doesn't look like it felt any pain or discomfort, does it?" De Villa remarked.

"No," I admitted. "But how do you account for the enormous increase in weight. From your description of the principle and from the way the creature looked when it was being blown up I expected that it would be very light. With the same amount of matter in its body spread over such a tremendously greater volume, I should think its density would be extremely small."

"You seem to forget that I have added something to the ant's body. Although Spacite is very tenuous it has an appreciable density; in fact, it tends to assume the same density as the matter which surrounds it. Are you convinced now that my theories are practical?"

"I suppose so. But I'm afraid there is one flaw in your scheme which will knock the whole plan into a cocked hat."

This assertion of mine—the assertion of a callow youth to a man of marvelous scientific achievement, must have sounded ridiculously egotistical. But De Villa was very tolerant of my self-assurance. He merely grinned good naturedly and asked, "Just what is this flaw you think you have discovered?"

"You seem to have forgotten that my brain will be in a totally different condition from the brain of the ant after it is blown up. I can easily understand how you can reduce that monstrous insect back to its normal size by sucking out the Spacite that you used to inflate it with. But how about that piece of human brain inside the ant's skull? Wouldn't that remain exactly the same size? And if it did, wouldn't the brain tissues be destroyed when they were crushed inside the contracting walls of the ant's head?"

Much to my surprise, the doctor gave me a friendly slap on the back. "Let me compliment you, young fellow. Your question shows that you have been using that brain of yours. However, it happens that my scheme, as you call it, makes provision for the seeming flaw. The best way to convince you of this is to show you another demonstration. If you'll pardon me a moment, I'll see if I can find a subject."

He disappeared into the living room and a few minutes later came back with a cat in his arms. "Let me make you acquainted with Omar, my Persian kitten," he joked. "Omar and I are great friends. These experiments of mine are an old story to him. Here, Snookums, hop in there," and he bundled the cat into the chamber of the Volumalter.

While he was closing the door and adjusting the controls, De Villa said, "You will notice that the name of my machine, 'Volumalter' indicates that it alters volume. It makes things either larger or smaller and it works both ways equally well.

"First I shall fill the pores of the cat's body full of Spacite. To make sure that I have done this, I shall keep the power on until I notice a slight increase in the animal's size. This indicates that the Spacite has completely filled all the space between the particles of matter in the cat's body, completely displacing whatever other medium was there before. All I have to do is to withdraw some of the Spacite. I do this by means of this lever. Now the chamber is connected with a mechanism which sucks the Spacite out of the cat's body, thus causing the molecules of matter to draw closer together. Notice what happens."

This time, instead of expanding, the creature inside the Volumalter began to grow smaller. At the end of about ten minutes it was less than an inch long. De Villa turned off the power and opened the door. Picking up the tiny creature, he placed it in the palm of my hand. It sat there nonchalantly for a while, licking its tiny paw and washing its face; then it curled its forelegs under its body and lay down in a most cat-like manner. I stroked it gently with the tip of my little finger. By holding it close to my ear I could barely distinguish a faint, but contented purr.

"Gee!" But that's cute!" I exclaimed. "I bet you could make a lot of money selling cats like this. They would be right in style, you know."

"Right in style?" De Villa questioned. "I don't believe I comprehend your meaning."

"Can't you see? It fits in with the modern vogue for small things—pee-wee golf courses, miniature gardens, midget automobiles and all that sort of thing. Imagine what a hit a flock of microscopic cats and dogs would make!"

"There may be possibilities in your idea," the doctor laughed; "but I'm afraid I can't take the time to go into the midget animal business. I have too many other matters of extreme importance to occupy my attention. First of all I should like to know if you are satisfied concerning the feasibility of my plan."

"I have to believe my own eyes, don't I?" was my response.

"That isn't always a safe rule to follow, but in this case you may be certain that your eyes have not deceived you. That being the case, the next thing I would like to know is whether you intend to co-operate with me willingly."

"Sure thing!" I said. "Since it looks as if I'll have to go through with it anyway, I may as well be a sport and do it willingly."

"Great!" he cried, grasping my hand and pressing it warmly. "I can't tell you how much I appreciate this, Kenneth. It means more to me than anything else in the world. Let me thank you from the bottom of my heart."

"Oh, that's O. K.," I stammered.

Now that the die was cast, I felt a strange surge of emotion swirling inside of me. I turned my head away so that De Villa could not see the unmanly tears which were welling up in my eyes, despite all my efforts to hold them back. When I could control my voice, I said, "I guess I ought to thank you, too. Not so much because you saved my life. You've done more than that. You've given me a reason for wanting to live and to accomplish something. I hope you'll excuse me for the senseless things I've said and done. Will you?"

"Of course, I will, Kenneth, my friend. There really isn't anything to excuse. You simply acted on your natural impulses. I knew you would come around when you really understood." He glanced at his wrist watch. "Hello! It's after one. My stomach says it's time for lunch. Come on. Let's adjourn to the kitchen and I'll give you a good job peeling potatoes."

CHAPTER V

Final Instructions

WHILE we were eating an excellent luncheon, prepared by Doctor De Villa, with me acting as scullion, my host discussed with me the details of our proposed experiment.

"Does it make any difference to you when we start work?" he asked.

"Not a bit. Now that the thing is decided, the sooner we get going the better it will suit me."

"That's splendid! Suppose we plan to commence early tomorrow morning. Will that be satisfactory?"

"Can't we start this afternoon?"

"That might be possible, but I don't think it would be advisable. There are a number of preparations to be made. It will be necessary for me to give you complete instructions and to make sure that you understand thoroughly what you are to do."

"O. K. Can't you start shooting me full of information right away?"

"I suppose I could. But suppose we eliminate the shop talk for the present—at least while we are eating."

"You're the doctor. But as far as I'm concerned I can't think of anything more interesting to talk about than what you call shop talk."

"Very well, then, suppose you tell me what to do with the ten thousand dollars which I am going to turn over to you?"

"Listen, Doc," I said familiarly. "I don't like the idea of selling myself for a sum of money like that. If you want to do so, you can pay me a salary, but even that won't be necessary, since I can't very well spend the dough while I'm masquerading as an ant."

"But after the experiment is completed and you resume your life as a human being, I think you will then find that ten thousand dollars will come in very handy."

"Perhaps so. Let's leave it this way, then. You keep the money. If I need any of it, I'll call on you. Is that O. K.?"

"Yes, of course. But suppose—Oh, I may as well be frank with you and tell you that, although I shall take every possible precaution to safeguard your life—you will be in constant danger. Suppose I do not succeed in bringing you back. Suppose you are lost or killed—what shall I do with the money then?"

"Keep it yourself."

"But isn't there someone you'd like to give it to—your girl friend, Miss Hill, for instance."

"No. I'm afraid it wouldn't help her. It would be more likely to harm her. Her folks are well fixed. She has always been pampered and petted. Ten thousand of her own might spoil her."

"And there is no one else."

"Not a soul."

"But how about charity? Isn't there some worthy cause toward which you would like to contribute this money—as a sort of memorial—a tribute to the memory of Kenneth Williams?"

"Nix! When I pass on, the sooner I am forgotten the better it will suit me. But if it will make you feel any better, you pick out the charity yourself and donate the money in the name of the Unknown Scientists who are constantly risking and sacrificing their lives in the interests of human knowledge."

"That's an excellent idea, Kenneth, and you deserve a great deal of credit for thinking of it."

For a while we ate in silence. Then I began to snicker.

"What's the cause of all this risibility?" my companion wanted to know.

"I just thought of something. Suppose while I am engaging in the industrial, domestic and social activities of the ant colonies, I happen to fall in love with a cute little lady ant? Isn't it possible that I would become so infatuated that I would want to get married, settle down and raise a family of little antlets all my own?"

This amused the doctor immensely. It was several minutes before he could stop laughing long enough to talk.

"I can see that you don't know much about the matrimonial affairs of ants," he chuckled. "In the first place, the ant into whose body I intend to transfer your consciousness will not be a male, but will be a worker. Perhaps I ought to explain that in one sense there are three different sexes of ants. They are the female or queen ant, the winged male and the workers. The workers are really females but, except in very rare cases, they do not propogate. Some naturalists refer to them as being of the neuter sex.

"Many ant colonies contain only one queen. All she does is lay eggs. She never leaves the nest. Food is brought to her by the workers who make up the bulk of the inhabitants. When the eggs hatch out, some of the young ants are born with wings, while the remainder, the workers, are born without wings. On a certain day, the winged ants—male and female—emerge from the nest and launch forth on the nuptial flight. The males have very large sharp eyes. Weddings take place in midair.

"The male ant is a very stupid fellow. His only purpose is to reproduce the species. He is so helpless that he can't even make his way back to the nest or find food for himself. Usually he dies within a few days after the marriage."

"If that's the case, I don't think I'd care to be a male ant," I interposed.

"I didn't think you would. The life of a worker is much more interesting."

"BUT what about the queens? What happens to them?"

"They immediately proceed to establish colonies of their own. Various methods are used by different species. Sometimes the fertile queen calmly appropriates the nest belonging to another queen, murders her royal rival and takes possession of the throne. In other cases she ingratiates herself with the workers, and they turn against their old queen and put her to death.

"But the most common method is for the queen to start a colony with her own offspring.

"The first thing she does on alighting is to tear off her wings. The large wing muscles are gradually absorbed by her body, thus providing sustenance for her during the time it takes for her first eggs to hatch.

"She searches out a suitable place, in a cavity or under a stone, and there she starts to lay eggs. She takes care of the first arrivals herself, but as soon as enough worker ants have matured they immediately tackle the work of excavating a nest, feeding the queen and caring for the eggs subsequently laid. As a result of the one nuptial flight, a queen ant can produce a family numbering several hundred thousand."

"Whew!" I exclaimed. "There's certainly no birth control or race suicide among the ants, is there?"

"Hardly," he replied. "That's one reason why they have advanced so rapidly.

By this time we had finished our luncheon.

"Let's go back to the laboratory," the doctor suggested. "I have some work to do, if you don't mind. But it is more or less mechanical in character. I can talk to you while I am working."

He donned a pair of overalls, rolled up his sleeves and began to putter around with the Volumalter, cleaning, oiling and adjusting the various parts of the machine.

"Have you any questions you would like to ask before I give you your final instructions?" he inquired.

"Yes, I have. Whereabouts is the ant colony located —the one where I am supposed to belong?"

"In the garden of my estate. It's between here and the Mexican border. I have a place that is ideal for the purpose. In it there are seventeen ant hills, all of different species of ants. Three of them were established there naturally. The others I started myself, by bringing a fertile queen and a few workers from nests in various parts of the United States, Mexico and other countries. I have taken a great deal of pains to provide the environment needed by each species of ant to develop naturally and prosperously, so that all my colonies are living exactly as they would in their native habitats."

"Have you picked out any particular colony to be my future home?"

"I have given the matter some thought, but haven't decided definitely yet. It is only fair that your preferences, if you have any, should be taken into consideration."

"How should I know which one to select? To me one ant hill looks just like any other one."

"It all depends on how you feel about adventure and danger. For my part, I'd much rather start you out in a peaceful colony where the risk would be minimized. There are several reasons for my preference: One is that it will give you a better opportunity to orientate yourself and to become accustomed to your ant body before being forced to face any serious crisis. Another reason is that I am anxious to surround the first phase of our experiment with every possible safeguard. My chief concern is to verify my belief that you will remember everything that happens while you are occupying the ant's body. After we have established this point, in case you yearn for more excitement and adventure, I can easily place you in a colony where you are sure to have plenty of strife and turmoil."

He paused a moment, as if waiting for my reaction.

"What you say sounds reasonable enough," I responded. "I meant what I said about craving adventure, all right, but there's no need of jumping into serious danger right off the reel. The peaceful colony sounds good to me. What am I supposed to do after I get into it?"

"That question reminds me of a story. Stop me if you've heard it. A middle-aged lady was taking her first ocean voyage. She went to the captain and said, 'Suppose I get seasick, what shall I do?' To which the captain replied, 'Don't worry, Madame, you'll do it.' "

"You mean that my actions will be governed by instinct or something like that?"

"Within certain limits, yes. The main thing for you to do is to act naturally. Do whatever seems to be the best thing under any given set of circumstances. About all the instructions I have to give you is concerning the means by which I can get you back again."

"Now that you mention it, that *is* rather important, isn't it?" I rejoined. "In a family of several hundred thousand, all looking exactly alike, it isn't going to be so easy for you to pick out little me, is it? Gosh, I'm glad you thought of that!"

"I try to think of everything. Several schemes have occurred to me. I believe the most simple one will be for me to tie a fine white hair around your body. Then, when you want to come back you can separate from the others and stand by yourself in a conspicuous place near the nest. I'll visit the nest at periodic intervals. With the aid of a reading glass, I'll be able to recognize you. Then I can pick you up and bring you back to the laboratory.

"In case I wish to summon you, I shall signal to you with a riveting machine. By operating this in contact with the ground a few feet away from the nest, I shall produce a miniature earthquake, which will be different from any other vibration in the earth and which you will be able to feel no matter where you are or what you are doing. When you feel the earthquake, you are to come into the open and stand still a short distance away from the nest. Do you understand?"

"Sure! That sounds simple enough. But you haven't told me yet what kinds of ants you have selected to be my sisters."

"I have a very fine colony of leaf-cutting ants. The insect we enlarged this morning is one of them. She will make a good subject for our experiment just as she is. Take a good look at her, so you'll know what you'll look like after the operation."

Following his suggestion, I stepped to the glass cage in which the giant ant was confined and gave it a thorough examination. It didn't take long for me to understand what De Villa meant when he said the ant was beautiful. As I gazed at it then, realizing that soon my will would be directing that wonderfully formed body, it seemed to be one of the most attractive objects I had ever beheld.

De Villa called me away from my admiring scrutiny. "If you want me to, I'll give you a brief account of the activities of the leaf-cutting ants. I'd rather not tell you very much, however, because that might interfere with the spontaneity of your observations. These ants obtained their name because of their habit of biting off pieces of leaves and carrying them into their nests. No one has ever seen an ant eat these leaf particles. It has been definitely established that the ants don't use them for food. The first thing I want you to find out is what use the ants make of these leaf fragments. Scientists, of course, have been able to find out something about this mysterious custom, but I'd rather not tell you what the purpose of the leaf-gathering is. Your observations should either verify or disprove the usually accepted explanation of this phenomenon. Is that clear?"

"Clear as buttermilk," I assured him. "All I have to do is act like an ant detective. I'll snoop around the nest, find out what becomes of the leaf particles and come back and report to you."

"You don't necessarily need to come back right away. The likelihood is that you'll find other interesting things in the ant nest. If you feel like it, you can remain for several days, or as long as you wish."

"O. K. Whenever you are ready, I'll be there with bells on."

I SPENT the remainder of the afternoon helping Doctor De Villa with his laboratory work.

At six o'clock we ate another homemade meal. After dinner we adjourned to the living room. In some mysterious manner, the evening paper had made its appearance on one of the tables.

It isn't often that a person is permitted to read his own obituary notice; but that rare privilege was accorded to me. There on the front page of the *"San Diego Evening Tribune"* I was startled to see my own photograph staring back at me. Most astonishing of all, right next to me was a portrait of Alice Hill. Our pictures were linked together with an enormous interrogation point. Above them, printed in stud-horse type was the caption:

"COLLEGE STUDENT IS LOVE SUICIDE"

There were no less than three articles in that issue of the paper in which my supposed suicide was discussed. One of them was a straight news item, telling about the two notes I had written, one to Alice and the other to my landlady. The discovery of my hat on the steamship pier and its subsequent identification were also mentioned. The article closed with a description of the unsuccessful attempts which had been made to recover my body.

The second article was written by someone who had communicated with the University authorities. From it I was surprised to learn that my former professors had regarded me as a model student. I couldn't help smiling when they attributed my act to a nervous breakdown brought on by overstudy.

But the story that gave me the biggest kick was the one signed by a sob sister who had interviewed Alice. She was reported to have said that we had been sweethearts ever since we were in grade school. She told of the way I had begun to get strange ideas about religion and how because of this she had quarreled with me. According to the lady reporter, she wept copiously during the entire interview and declared that now that I was dead she was just beginning to realize how much she had really loved me.

Reading this filled me with an intense longing to see Alice again. My first impulse was to ask Doctor De Villa for permission to phone or write to her, but after deliberating the matter more leisurely, I came to realize I ought not to do that even if my host would permit it, which was doubtful. What was the use of letting her know I was alive, only to have her find out that I was embarking on an enterprise from which I might never return?

So I stifled my yearning to communicate with Alice and said nothing about it to Doctor De Villa.

After I had finished reading the paper, I had a little chat with my host. "What is your opinion about religion, Doctor?" I asked him.

"I'm glad you brought this subject up, Kenneth," he replied. "I've been wanting to talk to you about it. If you don't mind my saying so, your case illustrates the familiar aphorism that a little knowledge is a dangerous thing. You learned just enough to destroy what you call your faith in religion. The fact that your previous belief was so easily undermined shows that it wasn't very well established in the first place. I think you will find this to be true. If you will keep on studying science and psychology and philosophy, you should begin to regain your faith in the teachings of Christ. You will cease to quibble about inconsequential details and will devote your attention exclusively to the fundamental principles. When you do that you will find it quite easy to reconcile your religion with your science and *vice versa.*"

"Maybe you are right," I told him. "Anyway, I hope so. If you feel like that after all the studying you've done, I guess there must be a heap of truth in what you say. It was a lucky thing for me that you happened to be watching when I jumped off that pier. I can't begin to tell you how grateful I am to you."

"Please don't say any more about that. You've already shown your gratitude in the best way you possibly could—by agreeing to help me with your willing and whole-hearted co-operation. This is going to be a wonderful event, my boy. I just feel it in my bones. It is going to bring everlasting fame to both of us."

"Let's hope so," I chimed in. "And now, if you don't mind, I'll hit the hay. This has been a strenuous day for me and I think a little sleep will do me good."

I started toward the laboratory with the idea of entering the elevator and returning to my chamber on the floor above, but I was arrested by De Villa's voice: "Where are you going?"

"To my room. You needn't bother to go with me. I found out how to operate the elevator."

"It won't be necessary for you to sleep there tonight. I designed that room merely to take care of emergencies such as occurred last night. Now that you have decided to be sensible and reasonable I have much more pleasant sleeping quarters for you."

He led me to a spacious bedroom located in a corner of the building. It had windows opening toward the south as well as toward the west.

"Aren't you afraid I'll sneak out on you?" I hinted.

"I'm sure there is no danger of that. I know I can trust you. Now that you understand everything thoroughly, you are free to do as you please."

"Thank you, Doctor. Thank you and good-night."

"Good-night and pleasant dreams," he said as he closed the door softly behind him.

CHAPTER VI

The Great Adventure

BRIGHT and early the following morning I rolled out of bed, dressed and went to hunt up Doctor De Villa. I found him in the laboratory, working assiduously.

"Gee, but you are a hustler?" I exclaimed after we had exchanged greetings. "Don't you ever get any rest? It looks to me as if you are always working."

"Not always. I had six hours of refreshing sleep last night. That's plenty for me. There is so much to be done and so little time in which to do it, that I can't afford to waste a single second. Are you ready?"

I began to feel a bit weak at the knees.

"Ready?" I stalled. "Aren't we going to have breakfast before we start?"

"I've already had my breakfast. I hope you don't think I'm unhospitable or inconsiderate, but it will be much better if you don't eat any breakfast, in fact it would be very unwise for you to eat anything just before the operation. However, you don't need to worry about being hungry. I shall promise you a nice breakfast of orange honey, just as soon as you have come out from under the ether in the guise of an ant."

"All right, then. But before we start, let me ask you one thing more. After you have cut open the ant's head and have transplanted part of my brain to the insect's skull, won't it take quite a while for the wound to heal?"

"Only a few minutes. I shall not attempt to replace the section of the ant's skull. Instead I shall close the opening with a special kind of cement. It dries quickly, forming a shell that corresponds perfectly with the outer covering of the ant's head. Within an hour after the time I commence, you will be ready to be put back into the ant nest."

"And will you use the same system when you bring me back again?"

"No. In that case I shall graft the bone back in place. It will take longer to heal, of course, but it will leave your head exactly as it is now."

"I'm glad to know that," I said with a gasp of relief. "Imagine the kidding I'd get if my friends found out I had a chunk of cement in my cranium!"

After I had repeated my readiness to proceed with the operation, Doctor De Villa got out a pair of clippers, a razor and a shaving brush.

"I'll have to give you a hair cut and a shave," he declared. "That's for sanitary reasons, you understand. Don't worry about your hair—it will soon grow in again."

With surprising skill he clipped, lathered and shaved my head.

"Now we are ready for Miss Ant," he announced. "Would you like to help me, or do you think the sight of the brain would bother you?"

"It won't bother me in the least. I'm not at all squeamish."

Nevertheless, I did feel myself becoming faint when I saw the living, throbbing grey tissue exposed to view.

When his work of preparing the ant was completed, the surgeon placed over the insect's body a dome-like cover, which he clamped fast to the operating table.

"That will protect it against infection while I am getting you ready," he explained.

As a final measure of precaution, he lathered my head again and scrubbed it vigorously with a stiff brush. Then he opened the door of the Volumalter and invited me to crawl inside.

When I reached the crucial point in the proceedings I began to feel a sinking sensation in the region of my solar plexus, but I wouldn't for the world have allowed the doctor to know I was scared. To cover up my fright I attempted a rather feeble jest.

"By the way, Doc," I remarked as I was climbing into the chamber of the machine. "When you serve me that honey for breakfast, would you mind letting me have some hot biscuits to go along with it?"

I stretched myself out at full length with my feet toward the door, which De Villa promptly closed.

Through the window I could see him as he adjusted the controls. Soon I distinguished the low hum which told me that the machine was in operation. I waited for a series of strange sensations but nothing of the sort did I notice. The only change I observed was that the chamber in which I was confined seemed to become slightly smaller. Then it expanded again to its former size. Before I could realize what had happened, the door opened and I heard the doctor's voice call out, "All right, Kenneth. Can you wiggle out yourself, or do you want me to help you?"

When I was standing beside him again, he asked me, "You didn't notice any unpleasant sensations did you?"

"Not a bit. In fact, I had no unusual sensations at all—either pleasant or unpleasant."

"Very well. Now suppose you lie down on this other operating table." He punched a hole in a can of ether and placed a cone over my face. I filled my lungs with the sweet, penetrating vapor. My body began to feel pleasantly numb. I was floating off into space, supported in some mysterious manner on a bed of swirling clouds. Then I took one more deep breath and lost consciousness completely.

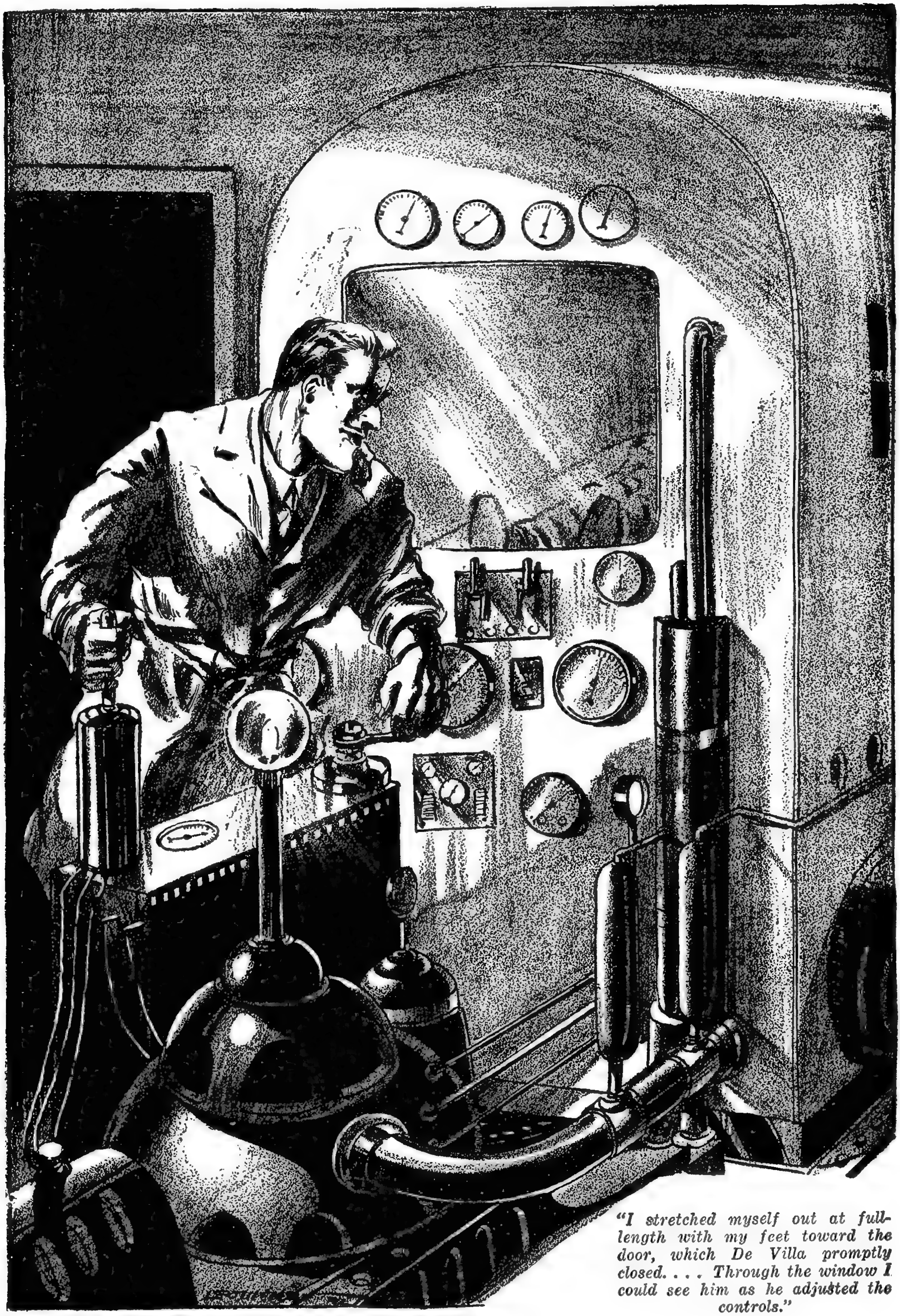
When I came to, my surroundings seemed bewilderingly strange to me. My eyesight was somewhat dim, but what it lacked in intensity, it made up in range of vision. I noticed a shiny, polished surface, evidently some metal part of the laboratory equipment, and stood in front of this make-shift mirror. I was startled to see the heads of several ants staring back at me. I learned later that it was my own head, duplicated many times by the multiple lenses of my ant eyes, which enabled me to see things in several different directions at the same time.

But the sensation that was uppermost in my mind was that of smell. I detected the most delightful odor, which seemed to thrill me through and through. It wasn't long before I discovered the honey which, true to his promise, Doctor De Villa had placed in front of me. After I had eaten a generous portion of it and had stowed away some more in my crop, I became obsessed with the idea that I must return to my home and share my treasure with my comrades.

Then I felt the floor on which I was standing move. I was lifted up and deposited in some sort of receptacle. Followed then a great deal of jolting and tossing about, which I attributed to the effects of an automobile trip. Finally something grasped hold of me and I was deposited on the soft, warm earth. I soon became aware of the presence of other ants who were hustling back and forth, too busy to pay any attention to me. There were two lines of them, moving in opposite directions. Those going one way were carrying bits of leaves in their mandibles, while the others had no burdens at all.

As I stood there for an instant wondering what to do next, one of the ants, who was slightly separated from the rest of the line, stopped in her tracks and began waving her antennae around. Apparently she had seen me or caught my scent. She approached me and began to size me up. It was a very thorough examination she gave me, exploring my entire body with her quivering antennae and sniffing excitedly. She seemed to understand that there was something unusual about me and I began to fear that I would not pass muster. It appeared, however, that her final judgment was in my favor, for she began to stroke my head in a most affectionate manner.

Before I realized what was happening I felt a very pleasant sensation and a droplet of honey which I had instinctly disgorged from my crop appeared on the end of my soft spongy tongue. Instantly my companion



"I stretched myself out at full-length with my feet toward the door, which De Villa promptly closed. . . . Through the window I could see him as he adjusted the controls."

pressed her mouth to mine, kissing me with all the fervor of a loving sister and swallowing the drop of honey contentedly.

THIS was my first experience with the ceremony of regurgitation, which plays an enormously important part in the life of every ant. The word "ceremony" is the proper designation for this act because it is always conducted in a formal, almost reverent manner. The ants are able to practice it universally because of a peculiar part of their physical make-up. This organ is the crop, which may well be called a "social stomach." In it the ant deposits and stores liquid food which is not digested but is kept intact. Only a small part of this food can get into the digestive system of the ant carrying it. The sole purpose of the food storage is a philanthropic one, namely, that of feeding her companions. Here is an example of Christian spirit that cannot be duplicated elsewhere. The ant is the most charitable of creatures. She owns nothing—not even the contents of her own body. And so long as there is a drop of food left in her crop she will give it away freely, not only to friends, but also to guests and in some cases even to enemies.

I don't want to give the impression that the ant looks upon regurgitation as an act of conscious charity. On the contrary, she does it instinctively and mechanically and she gets an immense amount of enjoyment out of it. Among the ants it is literally true that "it is more blessed to give than to receive."

Perhaps this looks like a long digression that has no bearing on my story. I can assure you, however, that it is extremely relevant and pertinent. It is impossible to understand the ant nature and ant character without having a clear idea of the important part which regurgitation plays among them.

Having thus been welcomed into my new environment with a kiss from one of my sisters, I immediately fell in with the procession of ants which was moving away from the formicary. Soon I came to the stem of a bush, upon which I climbed. Even without the examples set by my companions I seemed to know exactly what to do. I crawled out on a leaf and chewed a slit in the form of a semi-circle. This formed a sort of flap, which I grasped in my mandibles, tearing it loose with a quick jerk. Back along the branch I ran, carrying the leaf particle in my pincers. By following on the heels of the others I found my way back to the nest. Here we dropped the leaf fragments. They were picked up by other ants who were considerably smaller than the rest of us. These "home-bodies" never went more than a few inches beyond the opening of the nest. Their job was to carry the leaf particles inside and to get them ready for their ultimate purpose. Though I was still in the dark regarding the function which the leaves were to perform I seemed to understand clearly that all this work had something to do with our food supply.

On one of my trips to the formicary I witnessed a horrible tragedy. For some time I had noticed one individual ant who had been acting in a very strange manner. Instead of joining in our work, she wandered about in an excited manner as if she were looking for something. Whenever she came close to any of the other ants they would snap at her with their mandibles and chase her away. Once she came near me and I noticed that, although she looked exactly like the rest of us, she had a very unusual and unpleasant odor. In some mysterious manner I became aware of the fact that she was of the same nationality as my companions but belonged in another nest. Apparently she had strayed so far away from her own city that she had lost her bearings and had been unable to find her way home again.

Finally she had the temerity to crawl right to the opening of our nest. Before she had time to enter she was accosted by a terrible creature. It was an ant all right, and in some respects it resembled the little leaf-bearers very closely. On the whole, however, it looked like an entirely different species of insect. Compared to its tiny sisters its size was enormous. I estimated that it must have been at least two-thirds of an inch in length. Its head was much larger proportionately than the rest of its body and was armed with a huge and wicked-looking pair of pincers. It was clearly evident that those mandibles were built for fighting rather than for labor.

The gate keeper made a quick inspection of the intruder and condemned her on the spot. Before he could carry out his sentence, however, he was joined by five other warrior ants who were equally fierce and powerful. Between them they seized the luckless visitor and literally tore her to pieces.

In this merciless manner, our citadel was constantly being guarded against our foes and even against harmless visitors. It seemed to be an inexorable law of Antdom that all outsiders—even those belonging to the same species—were enemies who must be slain on sight. The ants had even gone to the extent of developing a special type of individual who was wonderfully adapted for its particular work as a policeman, soldier and guardian of the nest.

Though this suggested an extra guarantee of safety to those within the ant city, it gave little comfort to me while I was still outside the nest. I realized suddenly that in order to get inside the formicary I would have to run the gauntlet of these six inexorable defenders. To be sure I seemed to have been accepted by all the other leaf-bearers I had encountered. On the other hand, I couldn't forget the excitement that had been caused by my first meeting with one of the small ants. I had been accepted and welcomed, it was true, but I couldn't help wondering if I would be equally so fortunate when the time came to face the gate keepers who were specially trained in detecting the presence of strangers.

I realized, however, that I would have to do it sometime before night came, so I tried my best to screw up my courage for the crucial attempt. In this I was aided somewhat by a group of my companions who suddenly quit carrying the leaf particles and started to file into the nest. This would make it easy, thought I. All I needed to do was to join the procession. Surely the guardians would not notice anything peculiar about me when I was with a gang of others who looked just like me.

When I crawled through the opening, however, I soon found out that I would have to submit to inspection. Not a solitary one of my fellow workers got by the sentries without being challenged. It looked as if they were exchanging a pass-word of some sort, but in reality, the guardians were identifying each individual by the sense of smell. When it came my turn to be smelled I felt a bit shaky at the knees, as I noticed that I was being detained much longer than any of the others which had preceded me. I tried to push onward but the huge warrior grasped me gently with her mandibles, holding me firmly without hurting me. Meanwhile it was waving its antennae excitedly and two of the other soldier ants came running to see what was going on. They, too, inspected me in a way that suggested a suspicious uncertainty.

I realized that my position was a very critical one. Though their attitude was not exactly hostile, neither was it friendly. Had one of them taken a notion that I was an imposter, she would undoubtedly have attacked me without mercy and I would have suffered the same fate as the hapless ant I had seen torn to pieces a few moments before.

With the small portion of human brain which I had inside my head, I tried to figure out some way to help myself. Suddenly an idea came to me. Quick as a flash, I regurgitated a droplet of honey from my crop and offered it to the nearest soldier. Apparently she was amenable to bribery, for she swallowed it greedily. In like manner, I paid my toll of "sugar" to the five other policemen and was allowed to pass unmolested.

Running along the tunnel for a short distance, I came to a side passageway terminating in a large vaulted cavern. Here I found a large number of the smallest sized ants. They were busily engaged in mascerating the leaf particles which they carried in from outside.

Perhaps you wonder how I was able to distinguish what the other ants were doing in the darkness of that subterranean chamber. I fully expected that I would be able to see in the dark, as some animals are supposed to do, but such was not the case. Instead I seemed to be guided almost entirely by my sense of smell. This was the most remarkable thing I noticed during my first day among the ants. Because my sense impressions have no parallel in human experience, they are very difficult to describe.

The only way I could explain it to myself was by analogy. It seemed as if I could perceive a series of clearly defined *images*, but instead of being made up of patches of light and color, these mind pictures were composed entirely of odors. With the aid of my organs of smell, which were located in the tips of my antennae, I was able to obtain what seemed to be very accurate "scent images" of all my surroundings, including the underground caverns, my fellow workers and the other occupants of the nest.

Not only was I able to smell out the presence of the things around me, but I was also forming dependable conclusions regarding their size, shape, and distance away from me. In the case of moving objects, I could easily tell how fast they were traveling and in what direction. Thanks to this remarkable ant faculty, I was able to learn of many things which otherwise would have escaped my observation.

ONE thing I observed is that there is just as much difference between individual ants as there is between different men. Due to the inability of the ordinary man to put himself in the place of an ant, we humans are prone to believe that all ants look exactly alike and behave exactly alike.

Nothing could be further from the truth. In my little colony of workers I found all sorts of types. There were no two which even remotely resembled each other in physiognomy. Conspicuous differences were also noticeable in their characters. There were ant flappers and ant prudes; there were egotistic ants and ants with inferiority complexes; there were intelligent ants and dumb ants, kind ants and cruel ants, brave ones and cowardly ones, generous ones and stingy ones, industrious ones and lazy ones.

The last named class were not at all numerous, to be sure. Most of the ants I met deserved the reputation which *all* ants have received for being hard workers. Nevertheless, there were a few slackers, even in my busy colony.

I shall never forget one of these shirkers. I called her "Lazy Mary." She used to hang around the nest all day long. When she got hungry she would approach one of the workers, coaxing with her antennae and begging for food. In this panhandling she was very successful. If the other ant had anything in her crop, she would invariably regurgitate a droplet and give it to Mary. Most of the ants were too busy themselves to notice that the little beggar wasn't doing any work. Once she came to me, soliciting food. I gave her a drop of honey from my crop, at the same time suggesting to her, by the motions of my antennae, that she could find food for herself if she would go and hunt for it.

She made a hateful face at me, sticking out her tongue and wiggling her gaster as if to say, "You mind your own business." Nevertheless she didn't ask me for any more honey after that.

Lazy Mary wasn't the only parasite in our nest, however. Much to my surprise I learned that our home was occupied by insects of other species who did not work themselves yet lived comfortably on food contributed by the good natured worker ants. Some of these "Hobo Bugs," as I dubbed them, were about the same size as the ants but were quite different in structure. Their bodies were shaped like tiny carrots, with the tops rounded off. They had six legs apiece and their tails were divided into three pointed segments.

The first time I saw one of these tramps obtain some food I found it very amusing. As frequently happens, two worker ants met and proceeded to go through the formalities of regurgitation. Just as the droplet of food appeared on the tongue of one of them, Mister Hobo darted from his hiding place, sneaked under the heads of the ants and snatched the morsel right from under their noses. Strange to say, the ants paid no attention to the little sneak. With the idea of scaring it rather than trying to hurt it, I dashed after the hobo and made a grab for him with my mandibles. I found, however, that his tapering body was covered with hard, glossy scales and he seemed to have no difficulty in slipping out of my grasp and scampering away.

Though the hoboes and the loafers were a bit annoying, the workers didn't seem to mind them. The ants had become resigned to the idea of tolerating the parasites. Fortunately we seemed to have plenty of food to give away.

It was some time before I found out where this abundant supply of food came from.

After I had wasted a few moments in watching the Hobo Bugs, I returned to my job of chopping up the leaf particles. The small "Home-Bodies" had already finished mascerating a considerable amount of the leaf substance, which they had rolled into tiny balls and had spread out neatly in a smooth, flat bed.

I saw several of them quit and run further into the nest. To find out what they were going to do, I followed them to another large chamber. Here there was a bed quite similar to the one I had just left, except that it was covered with filaments of a sort of fungus growth resembling mushrooms. The ants nipped off some particles of this vegetable formation and carried them back to the chamber where the bed of leaf compost had just been prepared. Dropping the particles of fungus on the newly formed bed, they covered them over carefully with the leaf pellets.

Then for the first time the truth dawned on me!

We were really Farmer Ants, or Mushroom Growers. All this gathering of leaf particles and the subsequent preparation of the beds had been designed solely for one purpose—to raise food for the colony in underground fungus gardens.

I verified this later when I ate some of the mushrooms and found them very pleasant to the taste.

Now that we had prepared our seed bed and had planted our crop there would be nothing to do but wait for the harvest, thought I. But I soon found out that there was plenty of work to do in the nest besides gardening.

Taking care of the brood was the biggest job of all. It seemed as if this important task occupied the time of thousands of ants almost constantly. While there were some ants who specialized in the nursing work and did little else, there were many times when all the rest of us helped them with their manifold duties.

I have seen a lot of human mothers who were constantly fussing with their children, but none of them showed anywhere near as much solicitude for their charges as the ants did for their baby sisters. In our nurseries there were four different kinds of infants, the eggs, the larvae, the pupae, and the imagal instars or immature antlets.

My sojourn in the Mushroom Growers' home soon corrected certain erroneous ideas I had previously had regarding ants' offspring. I recalled one mistake I had made when I was a boy. While watching a colony of ants move to a new nest, I noticed that some of them were carrying egg-shaped white objects which were quite large, nearly as big as the ants themselves. I immediately assumed that these objects were eggs, but my experience as an ant taught me that they were really cocoons enclosing the nymphs or pupae.

Ant eggs are small, almost microscopic in size. The ones I have seen by daylight were pale yellow in color. They were surrounded by a sticky fluid which held them together in clusters like bunches of grapes. As soon as these eggs were laid they were removed by the queen's maids of honor and were carefully deposited on the beds of growing mushrooms.

On the day I arrived I saw several of the eggs hatch out. The creatures which emerged from them were soft, legless, translucent grubs. An ant larva is shaped like a crook-necked squash or gourd, divided into clearly marked segments and terminating in a small but well defined head. I counted the ridges in one of these tiny grubs and found that there were exactly thirteen of them. The larvae were completely covered with fine hairs which kept them warm and prevented their bodies from coming in close contact with the ground or with other objects.

Apparently these grubs were equipped with organs for spinning silk. After they had developed to a certain point, they surrounded themselves with snow-white cocoons. Then they were buried in the earth by the nurses. Thus protected they went through the chrysalis or pupal stage of their development. When the right time arrived, the mature ants dug them up and by carefully biting holes in the cocoons helped them get out of their prisons.

The little ones that crawled out of the cocoons were shaped like grown ants, but differed from them materially. A few had wings but most of them were wingless. They had soft bodies and for this reason had to stay inside the nest until their protective armors of chitin had become hard.

OUR formicary was a large one and was divided into innumerable chambers and passage-ways. Most of the time the eggs were stored in the upper stories where they would get the benefit of the sun's warmth. The floors below them were reserved for the larvae. Still further down were the chambers in which the cocoons lay buried.

The eggs, the larvae and the nymphs all had to be cared for constantly. The nurses were forever licking them, cleansing them, turning them over and arranging them in the order of size. Like other infants, the larvae were always hungry. They were fed by the living nursing bottles, who chewed the mushroom growth, deposited the juices in their crops and then regurgitated the liquid for the benefit of the baby ants.

In the middle of the day the upper chambers, which were exposed to the powerful heat of the California sun, became so warm that the eggs were in danger of being baked. But the efficient nurses were right on the job. They set to work diligently, picking up the clusters of eggs in their mandibles and carrying them to another large chamber at a lower level where the temperature was more salubrious. Late in the afternoon, however, the nest cooled off and all the eggs had to be brought back again to their original resting place.

Toward evening of the first day I had the honor of being presented to the queen mother of our colony. The way this came about was extremely significant. I was crawling along one of the passageways inside the nest when I encountered an ant which I recognized instantly as the one which had first greeted me. She seemed to remember me, too, probably because of the unusual food I had given her. This time she wasted no time in examining me, but immediately assumed a position facing me and began to stroke my head with her antennae. Followed then the pleasant sensation, the regurgitation of the droplet of my crop and the sisterly kiss.

This time, my friend became very much excited. She would scamper away for a short distance and then stop, waving her antennae at me. Then she would come running back and would nudge me with her head. It was perfectly clear to me that she wanted me to accompany her into one of the tunnels leading away from the main passageway, and I was stubborn enough to pretend I didn't know what she wanted me for.

I could almost hear her say in a coaxing manner, "Come along with me, Sister, please do." But I didn't budge. Her demeanor changed slightly. She didn't exactly seem exasperated, though I could plainly understand that she pitied me for my seeming stupidity.

"You certainly are a dumb one," was the message she transmitted to me, "but you've just got to come along with me, so I suppose I shall have to carry you."

Though she was much smaller than I, she didn't have the slightest trouble in doing this. With the utmost care and gentleness she seized me with her mandibles, lifted me off the ground and hurried through the tunnel at a brisk trot. Soon she entered a small chamber and deposited me on the floor. It took but a few good sniffs to tell me that I was now in the holy-of-holies—the royal chamber of the queen.

There she lay in regal splendor, surrounded by ten or twelve of her most trusted retainers. She was fully four times as large as any of the rest of us and the mature nurses reminded me of baby kittens as they climbed over their huge parent. Four of them were giving her a bath, licking her thoroughly with their soft spongy tongues. Cleanliness was the first law of the throne room, just as it was everywhere else in Antdom.

Our mother had just laid a batch of eggs which were immediately removed by some of the nurses, who carried them off in the direction of the mushroom gardens.

Though I hesitated about coming close to her august majesty my companion pushed and nudged me until I was face to face with the queen herself. In the most friendly manner she extended her mandibles and began to stroke me affectionately. I regurgitated an unusually large droplet of honey for her and she kissed me as she swallowed it.

Apparently she found this unusual tid-bit very pleasant after her steady diet of mushroom juice, for she would not let me go, but continued to caress me until my crop was almost empty. It is impossible for me to describe what a source of pleasure this experience was to me. My greatest regret was that I would not be able to replenish the supply of honey in my social flagon so that I could bring more enjoyment to my queen.

Just as we ants kept cleansing our queen and her children with meticulous care, we also were everlastingly fastidious about our own personal cleanliness. Whenever we could spare a moment from our other duties we set to work scraping, brushing and licking our own bodies. In this work, we always assisted each other to clean the parts that were hard to reach. Though we had neither soap, water, brushes nor combs we performed these tasks with marvelous efficiency. As a matter of fact, we carried all the necessary tools and materials in our own bodies. We were all equipped with stiff-bristled brushes in the form of spurs attached to our forelegs. Our tongues constituted the best sponges we could ask for. I have reason to believe that our saliva was not only a powerful cleansing reagent but was also oily and germicidal. In no other way can I account for our absolute immunity against the molds and bacteria which must have abounded in our subterranean caverns.

Altogether that first day I spent among my little insect friends was a very busy one and an extremely happy one. Perhaps my imperfect descriptions of my activities have given the impression that they were rather menial and humdrum in character. Nothing could be further from the truth. To be sure, I had done nothing but perform tasks that men regard as commonplace. In one day I had been a farmer, a nurse, a porter, a caterer and a bath attendant. But everything I did was like a big adventure. Never in my life as a human being have I gone through a day that was more fraught with interest, excitement and wholesome joy.

And though I had expected nothing but the most peaceful experiences in that city of honest farmers, I was to witness that very night the most horrible scenes of criminal violence, of dastardly villainy and of deadly peril to myself and my friends.

CHAPTER VII

The Gangsters of Antdom

I HAVE already described two types of parasites who infested our ant city, namely, the loafers of our own species and the alien "Hoboes" who sneaked their sustenance from their good-natured hosts. Aside from the fact that they took toll from the common food supply without contributing anything by their own efforts, these two varieties of pests were harmless.

But that night I learned that the very walls of our homes were infested by thousands of other parasites who were so utterly vicious and unprincipled that they could easily qualify as the most perfidious scoundrels of Antdom. Strange to say, these unspeakable villains were also ants. They illustrated the well-known truth that the most dangerous enemies of ants are other ants—just as the worst enemies of men are other men.

I learned later that myrmecologists—those scientists who specialize in the study of ants—call these little criminals "Thieving Ants." I am sure that these same scientists would have used a much stronger term to designate a band of men who behaved in a similar manner. Suppose you try to put yourself in the position of the ants who owned this dwelling place. Imagine that the walls of your house are honeycombed with tunnels inhabited by a ferocious band of men who are so tiny that you cannot get at them without destroying your own home.

These Wall-Dwellers never come out when the family is up and stirring; but in the dead of night, when everything is quiet, they steal out of their hiding places in large numbers. If your wife or your children's nurse-maid happens to get in their way they attack her viciously, stabbing her to death with poisoned daggers. Then they rush to the room where your babies are sleeping, drag them from their beds, tear them to pieces and devour them.

That's exactly what those so-called "Thieving Ants" did in the home of the peaceful, kind-hearted Leaf Bearing ants.

With the aid of my newly discovered faculty for constructing "smell images," I witnessed a raid made by a band of these nefarious baby-killers. Pouring out of a tiny crevasse in the wall of a passageway they rushed for the room where the larvae were kept. On the way they passed several of the larger ants who didn't seem to notice the presence of the marauders—probably because they were so small and smelled exactly like the rightful owners of the formicary. I followed them at a distance and saw them enter the nursery. There were two nurses on guard, but the midget assassins attacked them without hesitation. It was like a bunch of rats attacking an elephant, but the odds seemed to be overwhelmingly in favor of the rats. They made free use of their poisoned stings, which were located at the ends of their gasters. Within a few seconds, the two brave defenders were lying on the floor of the chamber, writhing in agony.

I was going to attack the murderers myself, but held off, excusing my cowardice with the thought that under circumstances like this, discretion is the better part of valor. I did the next best thing and ran for help. In some mysterious manner I managed to convey to the first ant I met that our young ones were in danger. Instantly she began to butt her head against the wall of the nest, producing a vibration that must have been perceptible for some distance. In response to her signal, hundreds of ants, including many of the enormous soldiers, came running to our aid.

When we reached the scene of the crime we found the two nurses dead. Each of the raiders had grabbed a larva and had tried to run off with it. We made short work of those which had lagged behind, but many of them succeeded in darting through the tiny openings of their nest which were so small that we larger ants could not follow them.

I realized then that even among these hard-working, peace-loving farmers, the life of an ant was a constant battle.

By the time the last of the assassins had disappeared I was so fagged out that I gladly joined a group of my companions who had crawled into a sleeping chamber and had lain down to rest.

On the following morning our first duty was to straighten out the disorder which had been caused by the raid of the Gangster Ants. There were several dead bodies to dispose of. Those of the marauders were carried outside and were unceremoniously dumped at some distance from the nest. But we treated the remains of our friends with more care and reverence. I am not going to say definitely that the ants went through with a funeral ceremony. Let me just describe what happened and you can form your own conclusions.

Lying in the chamber were a few empty cocoon cases, which had recently been abandoned by their maturing tenants. Some of the ants cut slits in two of the cocoons and then carefully placed the bodies of the martyred nurses inside these improvised caskets. Followed by a solemn procession they then carried the coffined bodies of their friends outside the nest and deposited them on a heap of refuse. Tenderly and sorrowfully, the ants covered the biers with particles of dirt. I could almost swear that I saw tears in the eyes of the mourners as they slowly filed back to the nest.

In addition to acting as undertakers, we had to do a lot of housecleaning. Every particle of refuse or useless matter was picked up and carried out of the nest.

Once, when I was on my way back to the nest after doing a bit of scavenger work, I came upon a remarkable sight. A solitary ant was tugging away at a huge grasshopper leg, which apparently had become amputated during a struggle with some other creature. She was a small ant, but she made up in perseverence what she lacked in size. As she strained at the enormous object, she reminded me of a man trying to drag the body of a full-grown elephant for several miles through a dense forest. Considering the comparative size of herself and her burden, that analogy seemed to fit the task she had selected.

Despite the Herculean character of her job, she seemed to be making some progress, though it was, of course, very slow. She exerted herself terrifically as she grasped one end of the burden in her mandibles, braced her six legs and pulled the object toward her. Scores of other ants passed close by but none of them offered to help her. When I came near to her I discovered that she was the same ant which had first greeted me and had subsequently introduced me to the queen. Then and there I dubbed her "Diana," because of her hunting skill.

I hastened to her and, taking a firm hold on the grasshopper leg, helped her to drag it along the ground. As soon as she perceived what I was doing, she let go of the burden and came to me, thanking me with caresses of her antennae and at the same time demanding a droplet of food from my crop. I gladly satisfied her hunger and after a short rest, we tackled the job again, dragging the choice provender right to the opening of the nest.

HERE the huge gatekeepers rushed out to welcome us. After the customary greetings with the antennae and the inevitable regurgitations with which every important event was celebrated, the doorkeepers treated us with the greatest solicitude. While two of them relieved us of our burden, the others surrounded us, brushing the dust from our bodies, licking and caressing us with the tenderest care. Then they led us inside the nest to a special resting chamber which evidently was reserved for exhausted travelers.

Since I had dragged the load but a short distance, I was not at all tired, but Diana must have been terribly fatigued by her strenuous labors. No sooner had the doorkeepers left us than she fell into a sound slumber. By way of experiment I touched her gently to see if she would awaken easily, but she did not stir. Then I gave her a rough nudge. Still she slept. Even when I rolled her body over and over, she didn't seem to be at all conscious of what was going on but slumbered through it all.

Since I did not feel like wasting any of my precious time in a mid-day siesta, I left the dormitory and went to take a look at the fungus garden which we had planted the day before. Knowing how fast mushrooms germinate, I expected to find some evidence of growth, but I was totally unprepared for the remarkable picture which my sense of smell brought to me.

The bed of compost was completely covered with a tangled mass of fungus filaments. Swarming over them were scores of ants, frantically engaged in nibbling off the tips of the stalks, which seemed to grow faster than they could be pruned. In some parts of the bed, tiny capsules had already begun to form. (I learned later that these particular cryptogams are called Rhozites Gonglylophora and that the capsules are known as "Kohlrabis.")

Observing that my nestmates were having a hard job keeping pace with the rapid growth of the mushrooms, I pitched in and helped as well as I could. It was an exciting battle. There were several times when it looked as if the vegetables were going to win. They were growing so fast that they almost filled the entire chamber and we were all in danger of being trapped and smothered. Just when it looked as if we would have to give up and run for our lives, a band of reinforcements arrived on the scene and we got the fungus garden under control.

Just how long I remained in the nest of Mushroom Growers I had no idea at the time. So engrossed had I become in my new life that I almost forgot that I had ever been anything else but an ant. The thought of signalling to Doctor De Villa and of returning to my human body did not enter my mind. I made no attempt to keep track of the time, although I was cognizant of the fact that several nights had passed.

Then one day I became the victim of a frightful accident. Strange to say, it was brought on by the very thing that was designed to rescue me. I happened to be inside the nest, working in one of the side passageways. Suddenly the ground began to tremble with terrific force. To me it seemed a lot worse than a real earthquake, and I ought to know what I am talking about because I was in the big 'quake at Santa Barbara, when many of the largest business buildings were totally destroyed.

The force of the tremblor threw me over on my side and, just as I fell, a section of the roof came tumbling down on top of me. Several of the other ants were partly buried by falling dirt, but most of them managed to dig themselves out. In vain I tried to extricate myself. If the material on top of me had been all loose earth I could easily have done this, but it happened that a pebble, at least three times as large as my body was resting on top of the heap. I was not in pain, but the weight of the miniature boulder was so great that I couldn't move my legs. I perceived another ant coming toward me and my hope of rescue seemed certain. When I recognized the odor of the new arrival, I was not nearly so optimistic.

It was Lazy Mary. Instead of starting to dig me out, she crawled on top of the pebble, adding her weight to the heavy load already pressing down on me. She thrust her head close to mine, looking at me dumbly as if she could not understand why I was there. I managed to touch her head with my antennae. As eloquently as possible, I asked her to help me. "Come on, Mary," I tried to say. "Be a good sport and get me out of this mess, will you, old girl?"

She seemed to understand my predicament all right, but still she made no attempt to extricate me. Instead she stood above me, looking down at me in the most insolent manner. I felt sure that she was saying something like this: "So it is you, is it? You're the one that tried to make me work. Now you are in a fine fix, aren't you? Serves you right. That's what you get for butting into other folks' business. Think I'm going to bother about helping you? Nothing doing, old kid."

In the meantime, pandemonium reigned in the nest. For a while the workers rushed about in panic-stricken excitement. Then, in some mysterious way a concerted plan was transmitted to them. They began to move in a systematic, orderly manner. I noticed that most of them were carrying eggs or larvae in their mandibles and all of them were moving toward the exit. Then the significance of their actions dawned on me. Because of the disturbance, the order had gone out to move the nest. Within a short time our formicary would be deserted, and I would be left to my fate.

In vain I tried to attract the attention of some of the other workers. They were all so engrossed with their tasks, so excited in the general exodus, that they had no time for me. Finally Lazy Mary, dumb as she seemed to be, caught the fever. She climbed down from the boulder, walked up to an unburdened ant and calmly attached herself to the under side of the other's head. In this way she was carried bodily out of the nest. She was even too lazy to walk to her new home!

With Lazy Mary's departure all hope abandoned me. Useless as she turned out to be, her sisterly companionship had given me some comfort, since there was at least a remote chance that I could coax her to liberate me. But with her gone and all the other ants frantically absorbed in the engrossing job of vacating the nest, there was no possibility that I would be rescued.

At that moment the horrible events which I had witnessed that first night after my arrival popped into my mind. I suddenly recalled that the walls around me were swarming with murderous criminals who were only waiting for nightfall to come swarming out and to torture me with their poisoned stings. It was not a very pleasant fate to look forward to, I can assure you of that.

I began to wonder how long Doctor De Villa would wait for me. If he had been watching he must have noticed the general exodus. How would he interpret my failure to obey his summons? Would he guess that I was confined in the formicary and start digging for me? If so, what chance was there he would reach my cavern, or that he would be able to see my tiny head sticking out from a mound of earth?

Thus I worried as my wonderful sense of smell told me that the last ant had departed carrying the last baby with it and leaving me alone in the deserted nest. I found out, however, that I was not altogether alone. From some distant passageway I detected a powerful aroma which told me that one of the Ant Hoboes was still in the nest. Then another odor came to my nostrils—a familiar one and a very welcome one.

It was Diana—brave, dutiful Diana—who had noticed the absence of one of our worthless guests and, like the good Christian she was, had returned to the nest for it. Soon I smelled her approaching me. She was carrying the Hobo in her mandibles. I struggled with all my might, beating the air with my antennae and striving to attract her attention. I had no way of making any sound and even if I had it would have done no good, since we ants were all deaf. Fortunately, however, Diana noticed that my antennae were moving and she came over to investigate. When she discovered my predicament, she set down the bug and tried to pull the pebble away from my body.

Her efforts would have done credit to Samson himself, but the pebble was too much for her. She didn't give up, however, but began to dig away the dirt under one side of the tiny stone. When she had undermined it, she scampered to the other side and pushed against it with her head. After several mighty heaves, she managed to roll the pebble into the hollow which she had excavated with her mandibles. After that it was the work of an instant for me to draw myself out of the pile of loose dirt.

Diana did not wait for me to thank her. Picking up her living burden, she trotted toward the opening of the nest. I lost no time in following her. When I was outside I picked out an open spot that was in bright sunlight and there I waited in anxious expectation.

Soon I was relieved to feel something grasp hold of me. I knew at once that it was Doctor De Villa's tweezers: On the journey back to the laboratory, I kept repeating over to myself, "Thank God, I'm safe! Thank God I'm safe!"

CHAPTER VIII

Among the Slave Makers

THE next thing I remember I was lying on my side in my bed at De Villa's apartment. My head was swathed in bandages. I started to turn over, but the Doctor's voice arrested me.

"Careful. Better not move for a while yet. I just put a temporary covering over the incision in your head. It is likely to be somewhat tender."

"Temporary covering?" I echoed. "Why don't you put zippers on my bean and be done with it?"

De Villa chuckled, "I can see you are yourself again. Your sense of humor is still with you. How do you feel, anyway?"

"Sick," I told him. "Sick at my stomach."

"That's due to the ether. You'll soon get over it. How about your head? Does that feel all right?"

"Sure! My head is O. K. Throbs a little. Otherwise it feels like the same old bean."

"Thank God!" De Villa exclaimed fervently. "Thank God our experiment is a success."

"Amen!" I rejoined in a voice which was trembling with reverence. Considering my attitude toward religion I was surprised at my own reaction—even more so when I remembered how I had thought first of God when I knew my life had been saved.

"I'm going to ask you to sleep now," the Doctor ordered me. "I'm awfully anxious to hear about your experiences, but for the sake of your health we had better put that off until you've had a good rest."

This suggestion was welcome enough because I was very drowsy. I closed my eyes and in a moment was fast asleep.

On awakening I found De Villa seated at my bedside.

He gave me a tumbler of milk with a glass tube to drink it with.

"Do you feel like talking now?" he wanted to know.

"You bet!" I assured him. "What do you want me to say?"

"Whatever you feel like saying. Tell me what happened—in your own way."

I didn't need a second invitation. I told him about growing mushrooms inside the nest. I described the ant gangsters and the queen ant to him. I related my experiences with Lazy Mary and Diana.

He had a note book in front of him and a pencil in his hand but he made no use of them. I inferred that he already knew all about these things which seemed so wonderful to me. With his customary politeness he listened to me but I could see that he wasn't interested. He asked me a question:

"The inside of the nest was dark, of course?"

"Sure. Except in the uppermost chambers it was as dark as pitch."

"Then how could you see all these things you have described to me?"

"I didn't see them, I *smelled* them?"

"What! You smelled them?"

"Sure! When I was below decks, smelling was the onliest thing. I did nothing else but!" Then I launched forth into a description of "smell images." This time, the doctor was all attention. He took copious notes, asking me question after question and insisting on the most minute account of my sense impressions when I perceived what I called a "smell image."

"Now you've made a real contribution to science!" he exclaimed. "Students of ant behavior have suspected the existence of a faculty such as you describe but it was, of course, impossible to prove it except by looking at things from the ant's consciousness, as you did."

Another matter in which he was intensely interested was the method whereby the ants communicated with each other. Other than assuring him that sounds were not used at all and that nevertheless the insects were able to convey their ideas to each other as clearly as human beings do with spoken words, I was not able to enlighten him.

"Perhaps if you make a special study of the ant language you will be able to explain it more clearly next time," the doctor suggested.

"Next time?" I exclaimed. "What do you mean by next time? Isn't this the end of our experiment?"

"That depends entirely on you," he said. "You have performed a wonderful service and if you feel like quitting now, that is your privilege. I was hoping, though, that you would want to go back and learn about some of the other species of ants."

"But if you wanted me to do that, why did you bring me back to my human form? Why didn't you just transfer my ant body into the other colony."

"If I had done that you would have been torn to pieces. Ants resent the presence of strangers. You yourself saw an example of that rule when the gatekeepers killed the visitor. In order to permit you to enter a new formicary unmolested I'll have to transfer your consciousness to the brain of an ant belonging to that particular community. I was hoping, now that you've experienced the more peaceful phases of ant life, you would be ready for the exciting adventures."

"That's right," I admitted. "You promised me adventure and most of my time was spent planting mushrooms and nursing ant babies."

"Then how would you like to join a slave-making expedition?"

"Sounds intriguing. But suppose I happened to be captured and had to become a slave myself?"

"There would be no danger of that. Mature ants rarely, if ever, are taken as slaves. The slave makers steal eggs and larvae from another colony and hatch them out in their own nest. On the other hand, the ants whose nests are raided usually put up a battle, so there is sure to be plenty of excitement and a certain amount of risk. Does that appeal to you?"

"Sure does! I don't mind being an ant at all. It's a very interesting life. Something doing every minute. No chance to get bored. It isn't exactly what I'd pick for a regular career, of course, but as a stop-gap, I rather enjoy it."

"Then you are willing for me to transplant your consciousness to the body of a slave-making ant?"

"Sure! But why ask me about it? You could easily have made the transfer while I was under the ether, and I wouldn't have known the difference until I found myself in a new ant home."

"I didn't want to do that until I had first made sure that I could restore you to your human form. You have been so helpful to me that I just couldn't force you to go back again. I'm glad, though, that you are game enough to carry on. It means that the value of our work will be at least doubled."

"But how can you be so sure that the ants will perform for us. They don't hunt slaves every day do they? I don't see how that would be possible.

"Of course not. They would soon run out of victims. Fortunately, however, I have the stage all set for a raid. For several weeks I have kept two hostile colonies in my garden. They are only a few yards apart, but are separated from each other by a ditch full of water. All I have to do is drain the ditch. It won't take long after that for the slave makers or "Amazons," as they are sometimes called, to discover the presence of their prey. Then there is sure to be a raid and a battle."

"And is your idea to put me on the attacking or the defending side?"

"On the attacking side of course. A fight like that is always very uneven. If you were in the defending ranks you would be almost sure to get beaten and you'd stand a good chance of being slain."

"Don't any of the slave makers ever get licked or killed?"

"Oh, yes, indeed. But they are larger than their adversaries and are built for fighting. This gives them a big advantage."

"But that doesn't sound very sporting to me. I don't like the idea of having to fight against set-ups like that."

"You don't need to do any personal fighting unless you want to. I suggest that you go along as a sort of ant war correspondent. You'll have all the risks, the excitement and the glory, but you won't need to fear that you are doing anything unfair or unsportsmanlike."

"O. K.!" said I. "I'll be the Floyd Gibbons of Antdom! But this time I hope you'll use some other method of paging me. That riveting machine stunt wasn't so hot, you know. It came near burying me alive," and I told him about my narrow escape when I got caught in the landslide and came near being left alone in the deserted nest.

"I suspected as much," he told me. "When you failed to appear immediately after I signaled I was afraid something had happened to you. You have no idea how relieved I was when you finally made your appearance."

"Maybe you think I wasn't relieved, too, when I felt you lift me up," I exclaimed.

"I'm sorry I caused you all that trouble. It won't happen again, of course. This time I won't try to summon you. I'll leave it to you to decide when you want to come back."

"But how am I going to let you know?"

"I'll keep closer watch this time. In order that I can be sure everything is all right with you, I am going to ask you to report to me at least once each day. This you can do by separating from the rest of the ants and standing in an open place by yourself. I'll be looking for you and I'll indicate my presence to you by picking you up and setting you down again. If you run away it will mean that you are not ready to return; but if you stand still after I set you down, I shall take it as an indication that you want me to restore you to your human body. Will that be satisfactory?"

"Sounds Jake to me. Let's go!"

DOCTOR DE VILLA had certainly laid his plans with consummate knowledge and skill. When I found myself inside the nest of Amazons I soon became conscious that something momentous was going to happen. My companions were dashing excitedly about the nest. Sometimes two or three would gather with their heads together, like football players in a huddle and would tap each other's heads vehemently with their antennae. Evidently they were discussing the strategy for the impending raid. From time to time, individual ants would come scampering into the nest from outside and would run from group to group, stopping just long enough for an exchange of signals with each group.

I surmised that they were scouts, who had been sent out to reconnoiter and who had returned to the nest to report what they had discovered.

After a great deal of this scouting and conferring, we formed in a regular column and emerged from the nest. When we came near the enemy's nest we separated into small groups, spreading out stealthily until we had encircled the doomed formicary. Apparently our adversaries had been warned of our approach, for they were already organized to resist us. The defenders were arranged in a circle, completely surrounding the nest.

My Amazon companions merely tried to break through the ring. They did not attack the opposing insects, but seemed intent on getting inside the other nest as quickly as possible. The smaller ants, however, were remarkably brave and aggressive. Without hesitation they hurled themselves at the invaders, in spite of the fact that their adversaries were nearly double their size.

There was no doubt in my mind that the strategy of the defenders had been planned in advance. While the shock troops in the front line did their best to hold back the enemy, hundreds of others came rushing out of the nest, carrying in their mandibles the eggs and cocoons. They scampered about, trying to get away to a place of safety with their precious charges. Most of these ants were pursued and overtaken by the Amazons. Invariably they fought to the death before they would relinquish their burdens. Several of them managed to elude their enemies and ran off to places of safety. I followed one of these and saw her crawl under a rock, dragging a larva with her.

Returning to the battle field, I found the ground strewn with dead and dying ants. Most of them were the small defenders, but I counted over a score of dead Amazons. My companions were streaming into the formicary, returning with eggs and larvae which they had found within.

I lingered behind to see what would happen at the looted nest. It wasn't long before the survivors began to straggle in. A few of them were still carrying eggs, but most of them had empty mandibles. They went back into the formicary and philosophically resumed the duties which had been interrupted by the raid.

Hurrying back to my own nest, I arrived there just in time to witness the tail end of the reception staged for the victorious warriors. Our army of raiders had constituted only a portion of our colony, the remainder having stayed behind in the formicary. They greeted the successful fighters enthusiastically, stroking them with their antenna and praising them highly in the ant language.

I had the foresight to pretend I was wounded. Limping along the outskirts of the excited crowd, I tried to make myself as inconspicuous as possible. I didn't get away with the ruse, however. Several of my nest mates noticed me as I came in and they observed that I was carrying neither egg nor cocoon. They surrounded me and gave me the razz as plainly and as thoroughly as a bunch of fight fans jeering at a yellow boxer. They paid no attention to my limp. Apparently an injured veteran received no sympathy in the tribe of the Amazons. I was glad to escape from my tormentors by mingling with the crowds surrounding the successful slave-makers.

When the excitement died down most of the ants emerged from the nest and arranged themselves in the form of a large ring. I wondered if this was the signal for another battle, but I soon learned that a holiday had been declared to celebrate the victory.

Near one end of the circle about a dozen ants lined up. Each one held between its mandibles a tiny round pebble about the size of an ant's head. At a given signal they dropped their pebbles and began to roll them along the ground, pushing them with their forelegs.

I soon realized that this was an organized game. The idea of it was to roll the pebble along the ground as rapidly as possible. Whichever ant succeeded in getting his pebble over to the further end of the field first we declared the winner. It was quite apparent that this was no spontaneous, haphazard test of skill, because the entire proceedings were conducted in accordance with a well defined and universally recognized system of rules.

Once, when a contesting ant had fallen some distance behind the others, it picked up its pebble in its mandibles and started to run with it. These unfair tactics brought it ahead of all the others, but when it dropped the pebble and started to roll it in the proper way with its forelegs, two of the spectators, who evidently were the referees, rushed out, grabbed hold of her and dragged her bodily off the field. Another ant which pushed the pebble with her head instead of rolling it along with her forelegs was treated in a similar way.

There were several of these pebble rolling contests, after which the field was cleared and two large ants took their place in the center of the arena. Instantly they started to scuffle with each other. I thought at first I was going to witness a duel to the death, but it soon became apparent that the ants were very careful not to inflict any dangerous injuries on each other. They were like two wrestlers. They pushed and tugged at each other's bodies. Though they made free use of their wicked mandibles for holding and shoving, they did not bite with them.

The ring seemed to be divided into two semi-circles by an imaginary diameter. Each ant tried to pull her opponent to her side of the ring. When their struggles had brought them in contact with the spectators, the fight was over. The victor would then strut out to the center of the ring and would rear up on her hind legs, turning around in all directions as if she was challenging the world.

There were plenty of the Amazons who were eager to pick up the gauntlet. Sometimes three or four would rush out at the same time. The one that got hold of the challenger first became the contender for the championship and the others would immediately fall back.

One of the wrestlers seemed to be a big favorite and deservedly so, for she licked nine aspirants to her crown in rapid succession. Because of her fondness for grasping the heads of her opponents with her mandibles, I dubbed her "Miss Strangler Lewis."

It wasn't long before the ranks of would-be champions had been exhausted. Miss Lewis was so palpably good that no one seemed anxious to dispute her superiority. Then she took to strutting around the ring, touching one ant after another with her antennae and hurling insect insults at all of them.

When she came close to me, I recognized her as one of the group which had razzed me because I had returned to the nest without any booty. She seemed to know me, too.

It is difficult for me to explain just how she conveyed her meaning to me. While she was "conversing" with me her antennae were touching my head and she may have tapped off her message by means of an ant Morse code. But I am not sure of this. For all I know, it might have been a case of mental telepathy. Of one thing I am certain, however. I was able to understand her just as clearly as if she had spoken to me in English. Translated, her tirade was something like this:

"So you're the Jane that went out after eggs and came back without any, are you? Phooey for you—you coward. Tried to make out you were hurt too, didn't you? Well you didn't fool me with your limp. What are you anyway, an ant or a lowdown beetle? Why don't you come out and fight? Haven't you any guts? Come on, I'll dare you!"

This was more than even a self-respecting war correspondent could stand, so I replied in the antennae language, "O. K., sister. My derby is in the ring. But let me warn you in advance that you're not going to fool me with that antiquated head-lock of yours. I'm too wise to fall for that old stuff."

Whereupon I went for her, using tactics that were older than the headlock. Sidestepping the pass which she made at me with her mandibles, I hopped nimbly on her back. Before she knew what was happening to her, I had wrapped one of my forelegs under hers and over her neck, in a perfect half-Nelson. With quick thrusts of my five other legs, I tripped her neatly and flopped her over on her back. Before she had time to recover herself, I grabbed her head in my mandibles and dragged her quickly to the edge of the ring.

My feat seemed to make a big hit with the fans. Miss

Lewis had not been a very popular champion, I learned. She was altogether too swell-headed—too much inclined to brag about her prowesses and to insult her comrades.

But I soon found that the position of champion wrestler in a colony of Amazons was not a very enviable one. Leadership always has its penalties. Mine was that I had to take on all comers. It was no easy matter to wrestle with a dozen fresh contestants one after the other in rapid succession with no rests between falls. Thanks to the tricks I had learned as a human wrestler and which the ants did not seem able to solve, I managed to get through the ordeal with my laurels undisturbed, but by the time the championship had been conceded to me, I was completely exhausted.

Thus ended the afternoon of sports and I was escorted back to the nest in triumph.

CHAPTER IX

Ant Bootleggers

IT was then that I noticed for the first time that our formicary was tenanted by ants of another species beside our own. On my previous visits to the nest I had not perceived this—probably because of the prevailing excitement and my unfamiliarity with the characteristic odors of my neighbors.

With more leisure for observation I soon learned, not only that the other occupants of the nest were of an entirely different species, but that they actually were the same kind of ants which we had fought against in our recent raiding campaign. Wonder of wonders, the Amazons and their small foreign associates were living together in the same nest and the most friendly relations seemed to exist between them.

Truth finally dawned on me. The small ants were slaves! They had been hatched inside the Amazons' formicary from eggs stolen in some previous raid. And now they were in full charge of all activities of the nest with the exception of the fighting.

The Slave Makers were wonderful warriors but seemed to be useless for any other purpose. All the work, such as enlarging the nest, taking care of the young and foraging for food was done by the slaves. The Amazons lived lives of indolence. Because of this they had deteriorated in intelligence. If we had been deprived of our faithful servants I am sure we would have starved. Some of us didn't know enough to feed ourselves, when natural food, such as a grub or caterpillar, was placed before us. The slaves seemed perfectly contented with their lot. They could easily have escaped if they had wanted to; but they remained faithful to their captors. It seemed incongruous the way these little hustlers would look after the big, ungainly fighting ants. They would clean us with the utmost care, licking our bodies all over and would force us to partake of the choicest morsels of food which they had previously prepared and regurgitated for us. They reminded me of a tender mother taking care of an overgrown, imbecile child.

In the relations between the Amazons and their slaves I saw an analogy with the experience of human beings. In ancient Rome, for instance, the indolence and luxury made possible because of large numbers of slaves taken in wars soon led to decadence of the Roman race and ultimately to its destruction. It was quite apparent to me that among the ants, as has sometimes been the case among men, the masters are slaves and the slaves are the real masters.

Strange to say, these insect slave-makers were not only indolent but dissipated as well. When she was not fighting or playing games, the life of an Amazon was one of self-indulgence and drunkenness. They actually became drunk; I mean just that. They were supplied regularly with a very intoxicating liquor by guests who were pampered and petted and fed and who had free run of the nest. For obvious reasons I called these strange insects "Ant Bootleggers."

They reminded me very strongly of a verse from Kipling's vampire:

> "A fool there was and he made his prayer
> Even as you and I
> To a rag and a bone and a hank of hair."

Each of the Amazons, I learned, was in the habit of making her prayer to a hank of hair. And it was blond hair, too—beautiful golden yellow in hue. The bootleggers, who resembled small beetles, were distinguished by these fine soft bunches of trichomes appended to the sides of their bodies. The blond locks concealed the openings of glands, of which each beetle possessed six. These glands secreted an aromatic, extremely volatile liquid. I don't believe that this liquor had any nutritive value whatever; nevertheless, the ants seemed to prefer it to good food.

The Amazons were continually licking the hanks of hair and they swallowed the secretions with great relish.

Out of couriosity I tried it myself. The stuff had a very strong smell and a fiery taste. When I gulped it down it went to my head, making me feel giddy and carefree. Thus it was that I drew an analogy between these guest beetles and human bootleggers. They were pampered, encouraged, protected and supported in luxury, just because they provided something from which their patrons derived a kick.

I found out later that the little slaves went to all sorts of extremes in looking after these bootleggers. The beetles were constantly being fed by the busy little workers. They bred inside the formicary and the ant nurses took better care of their eggs than they did of their own brood.

The bootleggers and the slaves were not the only guests who made their homes in the City of the Amazons. I noticed that some of the ants which had remained at home during the raid had tiny mites clinging to them. They made me think of the familiar doggerel:

> "Fleas have other fleas to bite 'em
> And so on, ad infinitum."

But these Antennophori, or ant mites, did not bite their hosts. Instead of being pests they were more like pets. None of the ants seemed to object to their presence in the least and the parasites took particular pains not to make themselves objectionable. Some of the ants had only one of the mites. Others had as many as five of the little beggars clinging to their bodies. No matter how many of them were riding around on a single ant, they always arranged themselves symmetrically so as to balance each other and to cause the least possible amount of discomfort to their host.

A solitary mite would cling to the under part of the ant's head. Two would attach themselves to the sides of the host's head or to the flanks of its gaster. When there were three, one would hang under the head and the other two would be fastened on either side of the body. In a similar way, four or five would distribute themselves in symmetrical patterns over the ant's person.

I happened to come close to a heavily populated ant, and in a twinkling of an eye, one of the mites had transferred its attentions to me. It clung to the under side of my head, successfully defeating all my attempts to dislodge it. Immediately the bugs remaining on the other ant re-arranged themselves to take care of the change in equilibrium.

I SOON got over the first excitements of trying to rid myself of the mite which had adopted me. Then the little rascal began to beg for food. It had long, soft legs which felt exactly the same as the antennae of an ant. With these legs, it titillated my head in a way that was actually pleasing to me. It reminded me of a cute little puppy that had been trained to beg for food by sitting up on its hind legs. I rewarded it with a droplet of regurgitated food and it thanked me eloquently with its pleasing, antenna-like legs.

It then became clear to me why the ants seemed so tolerant of these tiny parasites. Far from being offensive, they were very pleasant to have around. They occupied the same positions in the ant nest that a pet cat or dog does in a human habitation.

Despite the allurements of the golden haired bootleggers and the caresses of the ant pets, I soon became weary of the sedentary life of slave making ants. All of a sudden I realized that I had failed to keep my promise to report each day to Doctor De Villa. Then and there I resolved to lose no time in tearing myself away from the bad influence of the Amazon colony. I found out, however, that this wasn't as easy as I had expected. Whenever I started to leave the nest, a dozen or so of the others insisted on accompanying me. Perhaps this was due to the glamour which always surrounded a champion. Like the hangers-on at a boxer's training quarters, my fans hovered around me. It was impossible to shake them off.

Even with my unwelcome bodyguard I felt confident that the doctor would be able to recognize me by the hair which he had tied around my gaster. But though I stood around outside the nest for what must have been several hours, I was not picked up. When darkness fell and the ground became cold, I was forced to seek the shelter of the formicary.

Much as I tried to keep my spirits up I could not help worrying. Suppose something had happened to De Villa? He might easily have met with an accident or become ill so that he could not come and get me. If anything like that had happened, what would become of me? Would I be forced to spend the rest of my existence among those unattractive, degenerate insects? I was almost tempted to seek out a golden haired beetle and go on a spree so that I could forget my troubles. I had sense enough to realize, however, that such an act might easily spell my permanent ruin. In my present predicament it was absolutely necessary for me to keep sober and in full possession of my faculties.

For two successive days I strove to attract De Villa's attention. Several times I succeeded in breaking away from my coterie of admirers long enough to stand alone for several minutes, but still I did not feel myself lifted. De Villa's failure to rescue me became more and more puzzling to me. It wasn't like him to be neglectful. Surely something must have happened to him.

Then one morning, I suddenly found out what was wrong. I remembered that the only way De Villa could recognize me was by the hair which he had tied about my body. During my sojourn among the Amazons I had been through a lot of tumbling and scuffling. Was the identifying hair still there? With my legs, I explored my body, from my head to the tip of my gaster. The hair had disappeared!

All day long I hunted for another hair. Late in the afternoon, when I had just about given up the search, I came across enough hairs to mark the entire colony. They were on the body of a dead caterpillar. I soon gnawed off one of the fine hairs and wrapped it around my body. After considerable effort, I managed to tie a knot in it with my legs.

By the time I had accomplished this difficult feat it was already dark and there was nothing for me to do but go back to the formicary and wait for daylight.

Next morning I awoke to find the nest charged with excitement. For some reason, which I was not able to fathom, another holiday had been declared. I tried to sneak away but without success. It would have been as easy for Jack Dempsey to hide in the midst of a crowd of fight fans as for me, the champion wrestler of the Amazon colony, to make my getaway on a holiday like this.

Since there was nothing for me to do but go along with the gang, I tried to make the most of it.

As before, they started with the pebble rolling game. I was foolish enough to attempt the introduction of a new game for Antdom. It occurred to me that if they were intelligent enough to roll pebbles along the ground it ought to be possible to teach them the rudiments of a game like football. I managed to get the attention of a group of the contestants long enough to divide them into two teams and to explain to them that we would use only a single large pebble and that one side would try to roll it to one end of the arena while the other team would try to prevent them from doing so.

You can easily imagine what happened after that. Unfortunately it had not been possible for me to explain the rules to all of the spectators. They kept running out on the playing field, grabbing the pebble or pushing the players to one side. They were like a gang of hoodlums starting a riot because the home team was getting licked.

It wasn't long before they began to get rough. Instead of jostling and wrestling in a good-natured way, they began to snap at each other murderously with their dangerous mandibles. I was horrified to see a score of lifeless bodies, most of them with heads and legs missing, lying on the ground.

There seemed to be no rhyme or reason for the carnage—no distinction between friend and foe. Once the lust for battle had been aroused, the ants seemed to run amuck, snapping at each other indiscriminately.

Naturally I got my share of it.

Without warning, a militant lady ant seized one of my legs between her powerful mandibles and proceeded to bite it off. An instant later another one sunk her pincers into my side. I struggled with all my might to free myself, but both of them clung to me with more tenacity than any bulldog ever thought of using.

As if this wasn't enough, I was horrified to see a third ant come rushing toward me with murder in her eye. At first I had a faint hope that she might help me, but when I recognized her I had to abandon that idea.

She was Miss Strangler Lewis!

When she was close to me she taunted me, somewhat like this:

"So this is you, is it? I've found you at last. Now I've got you just where I want you, Miss New Champion!"

Then she hopped on my back, holding me firmly with her six legs, while she calmly and deliberately proceeded to gnaw hy head off! She didn't seem to be in much of a hurry about it, either. With all the fiendish cruelty of a cat tormenting a mouse, she nibbled at my neck, nipping off small pieces and pausing between nips to enjoy my suffering.

I made one last Herculean effort to shake off my adversaries. Throwing myself on my side, I rolled over and over. But my three assailants clung to me, intent on tearing me to pieces.

"Looks like curtains for me," I told myself, as, weak and exhausted, I quit struggling and waited for the end.

My rescue came from a totally unexpected source. Things happened so quickly and so mysteriously that for a while I was at a loss to account for them. First I noticed that Miss Lewis had stopped gnawing at my neck and had released her hold on me. Then I saw her lifeless body, crushed into a shapeless mass, drop to the ground beside me. A moment later, another mangled gaster, minus the head, lay next to it. I looked at my side and saw a bodyless head still clinging to me. This miraculous turn of events put new life in me and I started to grapple with my third adversary. But before I could do anything myself, two huge metal jaws came down from the heavens, seized the ant and squeezed it to death.

When I felt myself held gently between those same jaws and lifted off the ground, I suddenly realized that I had been saved by my human friend, Doctor Ve Villa.

CHAPTER X

Ant Cowpunchers

"WHAT in the world happend to you?"

This was the first question Doctor De Villa put to me when I was well enough to talk to him after my human body had been restored to me.

"I got into a fight," I informed him.

"So I noticed. But what happened to you before that? Why didn't you come out and report to me each day, as we agreed?"

I told him about losing the identifying hair in the wrestling match and my failure to discover its absence until the day before my rescue.

"But there was a hair tied around your body when I picked you out of that bunch of fighting ants. It was yellow instead of white, but I supposed it had become stained."

"I dug that hair up myself after I found I had lost the other one. It sure was a tough job for me to tie it in a knot that would hold."

"That was mighty resourceful on your part—and it was exceedingly fortunate for you. If it hadn't been for that hair I never would have been able to recognize you in that hurley-burley of battling insects. When I did finally locate you, I soon realized I had arrived just in time. A few minutes longer and you, including the human part of your brain, would have been destroyed. As it was your ant body was so badly mutilated that there was no hope for it. Luckily you kept your brain alive just long enough for me to make the transfer."

"O. K., Doc. Much obliged for saving me. So that's that. What comes next?"

"What comes next? Have you had enough of ant adventures?"

"As far as those slave makers are concerned, I'm thoroughly washed up on them. They are a bum lot—lazy, vicious and unreliable. They are not at all like the mushroom growers. I rather enjoyed living with that first bunch. In fact I never was so happy in my life. I wouldn't mind going back to them for a few days if you'll promise not to start any young earthquakes with your riveting machine."

"You don't need to be afraid of that," the Doctor grinned. "I never make the same mistake twice."

"A while back you said you never made any mistakes," I reminded him.

"Did I really say that? Perhaps I did. It was rather egotistical wasn't it—egotistical and silly. Everybody makes mistakes. The only persons who never make mistakes are those who never accomplish anything. But if you are really serious about being willing to pay one more visit to Antdom I can promise you some experiences which will be even more pleasant and more interesting than your work among the Mushroom Growers. How yould you like to become an Ant Cowpuncher?"

"An Ant Cowpuncher!" I cried. "That certainly sounds alluring. Will I have to ride a bucking horsefly?"

"No you won't have to do any bronco busting. But you'll have a chance to help herd the ant's cattle."

"That *is* interesting. Do you mean that ants not only raise crops but keep livestock as well?"

"That is precisely what I do mean. And I have a splendid colony of Cattle Herders in my garden. The correct name for them is Honey Ants. Would you like to join them for a few days?

"Sure! Why not?" was my enthusiastic response. "But there's one condition I'd like to make."

"And that is?"

"That you figure out some better way to recognize me when I want to return to you. So far your systems have been one hundred percent flops."

"Perhaps you are right. But I think I can forestall any possible difficulties by painting your back with a spot of orange color."

"But if you do that, won't the other ants notice it and think there is something phoney about me?"

"You need have no fears on that score. I have repeatedly experimented with ants marked in this manner and none of the other ants seemed to notice the difference in their comrade's looks.

"And you will be sure to keep a close look-out for me?"

"You may depend on that absolutely."

"O. K., then. I'm ready to become an Ant Cowpuncher."

"I am sure you will enjoy living among the Honey Ants," the doctor assured me. "You'll find them very nice people—much nicer than the Amazons. They are a very favored race of ants. Their food supply consists almost exclusively of manna."

"Manna?" I exclaimed. "Do you mean the stuff mentioned in the Bible—the food that was supposed to have been sent down from heaven to feed the Jews when they were in the wilderness?"

"Precisely. It isn't at all surprising that the Jews regarded the finding of manna as a miracle. That was the only way they could account for the presence of these deposits of sweet, nutritious food on the leaves of desert plants. We know now that the manna which fed the Israelites was produced by a species of plant lice which suck the sap from plants. In going through the bodies of these insects, the sap undergoes changes which convert it into a syrupy liquid called honey dew. The lice excrete this honey dew on the leaves of the plants. When it dries, the residue is a white, sugary scale, which the Jews called manna. In Australia, the gathering of manna, or "sugar lerp" as it is called, is a profitable industry today. One man can collect several pounds of it in a day and there is always a ready market for it."

"That's very interesting," I remarked, "But how do the ants get this manna?"

"Sometimes they gather it from the leaves, as the Israelites did. But more often, they obtain it in the original form of honey dew, direct from the lice."

"But how?" I persisted.

"You'll soon find that out when you join the Honey Ants. Wouldn't you rather wait and get your information first hand?"

"Sure! That will be the best way to find out, won't it?"

Ignoring my question, Doctor De Villa went on: "Speaking of the Israelites, the Honey Ants are similar to the ancient Jews in other ways. Like the Israelites, they have reached the pastoral stage in their development. Perhaps I ought to explain that one of the strongest points of resemblance between ants and men is that both genera have developed along parallel lines.

"The most primitive races, of both ants and men, are hunters. They are represented today by the African savage (for the men) and by Driver Ants (for the insects). And just as there are semi-savage tribes of men who live principally on fruit, nuts and other vegetable foods that grow wild, so there are also ants which gather seeds of wild plants and store them in their underground granaries against the time when there is no food left to be gathered in the field.

"Fighting races, like the Huns and the Tartars, who at times have lived principally by warring on other human beings, have their counterparts in the Amazon Ants, or Slave Makers.

"The next stage is the pastoral or semi-civilized period. Even today there are many nomadic tribes who gain their livelihood by keeping flocks of domesticated animals. In many respects the Honey Ants resemble these pastoral people very closely.

"You have already had an opportunity to study the Agricultural Ants, who occupy the next stage in the upward climb. Like farmers who live by tilling the soil, the Mushroom Growers plant their crops, take care of them and reap the harvest. In one sense, therefore, these Mushroom Growers have reached a very high stage of development—much higher than any animal, except man, has ever attained.

"So far the ants have not arrived at the topmost stage reached by the most highly developed men. We may call this the industrial and cultural age, which is characterized by the use of machinery and by the acquisition and recording of knowledge.

"No animal—not even the ant—has come anywhere near accomplishing what man has done in conquering and utilizing the forces of nature and in gaining knowledge and passing it on to posterity.

"On the other hand, there is one species of ant which has taken the first step toward the industrial age. They are called the Weaver Ants. Because they are the only animals, except human beings, who make conscious use of a tool, they may well be regarded as the most highly developed animals next to man."

"And will I have a chance to live among the Weaver Ants?" I asked.

"If you wish. But possibly you may have an opportunity to observe them from the outside. I have a colony of Weaver Ants who are close neighbors of the Honey Ants. You may be able to learn a great deal about them without necessarily becoming one of them."

"That's all very intriguing," said I. "And now, if you don't mind, I'll hit the hay."

THE following day I again submitted to an operation. Having my head excavated was now becoming a commonplace thing to me. It was not exactly an enjoyable experience, but I regarded it in much the same light as I did a series of disagreeable but necessary trips to the dentist.

I had no difficulty in getting by the doorkeepers of the Cow Punchers' nest. My password was a crop full of honey which Doctor De Villa had permitted me to imbibe before he placed me near my new home.

The architecture of this formicary was quite different from those of the Mushroom Growers or the Slave Makers, but in the general arrangement of the chambers and passageways, the effect was quite similar. One of the distinguishing features of the Honey Ants' nest was a system of long narrow tunnels, extending in several directions for long distances from the central portion. I noticed that in one of these tunnels the work of excavation was still going on. Through it hustled two steady streams of busy ants. Those coming out were carrying tiny grains of earth in their mandible which they painstakingly deposited outside the nest.

After indulging in the customary regurgitation ceremonies with two of my comrades, I joined the procession of unladen ants and marched into the tunnel. I must have made at least a hundred round trips, each time carrying a piece of dirt outside, before I discovered the purpose of this sapper work. We had finally reached what must have been the roots of some plant or shrub. Clinging to these roots were a number of little insects. In the darkness I could not see them of course, but by passing my feelers over one of them I found out that its body was shaped like a tiny lemon. The odor which emanated from these bugs was delightful. It was a sweet smell, like that of honey, but much more penetrating and appetizing.

Remembering the bootleggers and the Mushroom Growers, I jumped to the conclusion that the bugs we had just found were parasites of an entirely different species. It wasn't long, however, before I learned that far from being parasites, these tiny friends of ours furnished us with ample supplies of excellent, pleasing food. Not only that, but they were the *only* source of food which this particular colony of ants possessed.

By examining them more carefully and by visualizing what they would probably look like, I recognized the oval-shaped insects as Aphids or Plant Lice. I recalled that when I was a youngster several of our rose bushes had been seriously infested by these tiny pests. Their destructive effect on plants was due to their habit of boring through the bark and sucking the sweet sap into their bodies.

At first I thought that the ants would obtain this food, just as they secure it from each other—by regurgitation, but this was not the case. Apparently the Aphids were able to digest the plant sap and still secrete a very palatable and nourishing residue for the ants' benefit.

By watching the other ants, I learned how this food was secured. They stroked the aphids very gently and tenderly with their antennae. Evidently this gave pleasure to the plant lice, which obligingly secreted a droplet of honey dew. The ant promptly lapped up the globule and then repeated the same performance with another Aphid.

Upon completing this "milking" process with all the Aphids, the ants returned to the center of the nest. I followed them to see what they would do next.

Penetrating far into the lowermost recesses of the nest we entered a vaulted chamber. The arched roof was covered with some of the most peculiar objects I have ever "perceived." From their "smell images" I pictured them as being spherical in form. They were grouped in clusters like bunches of small grapes or currants. At first I thought they were some kind of fruit, which like the "Kohlrabis" of the Mushroom Growers had been trained to grow underground. But when, following the example of the others, I crawled up the wall of the cavern and approached these mysterious objects, I discovered to my astonishment that they were living ants!

It was no wonder that I hadn't recognized them when I first entered their chamber, for their bodies were swollen until they were at least ten times the normal size of worker ants. They reminded me somewhat of the large queen ant I had visited in the nest of the Mushroom Growers, but her gaster was oval in shape while the bodies of the huge Honey Ants were almost perfect spheres.

The dairymaids which had just come from the herd of Aphids disgorged the honey dew from their crops into the mouths of the currant-like ants, thus making them even larger than they were before. Then I understood. The inhabitants of this chamber were Repletes

—living flagons or honey-jars. Their crops had become distended until they made up nearly the entire bulk of the insect, squeezing all their other organs into very tiny spaces. Something told me that these self-sacrificing creatures were doomed to remain there for the rest of their lives, clinging to the roof of this subterranean chamber and serving as storage receptacles for the municipal food of the colony.

As I was about to leave the cavern of the Repletes, I smelled two or three newcomers, who did not seem to have any honey dew in their crops. They climbed up to the roof, each approaching one of the Repletes and demanding food. The dutiful insects responded by regurgitating some of the honey dew from their enormous crops and the workers went away satisfied and strengthened for the labors they were destined to perform.

Together with my newly found companions, I returned to the place where we had discovered the Aphids. The little cave which had been excavated around the roots where they were feeding had become uncomfortably cool, from which I inferred that night had fallen. With the most solicitous care, each ant picked up an Aphid between its mandibles and trotted back to the living quarters. Thus our cattle were carried to their underground "stables" which felt as if they were at least ten degrees warmer than their feeding place.

On the following morning, when the earth began to warm up, we again picked up our cattle, carrying them back to the roots on which we had first found them.

In this formicary, as in the other two that I had previously visited, there was a lot of work to do besides that of obtaining food. The nest was always scrupulously clean and free from refuse of every description. To make this possible a large squad of scavengers and janitors were kept constantly busy. There was also a considerable number of nurses whose duty it was to take care of the eggs, larvae and nymphs, shifting them from place to place, licking them repeatedly to cleanse them and feeding the young antlets. Since I wasn't especially interested in the career of a janitor or a nurse, I stuck to the job I had picked out first—namely that of herding the cattle.

I was kept so busy that there was not much time for reflection, but during one of those rare occasions when I was resting, it occurred to me that this particular colony was very happily situated. Thanks to the subterranean habits of the plant lice, we could even secure our food supply without going out of the nest. That led me to wonder if any of the inhabitants of the formicary would ever want to leave our underground home, except to get rid of dirt or refuse. It was perfectly obvious that a large number of them were constantly departing from the nest and returning to it again, for the passages leading to the exit were always crowded with workers. I watched them closely to see if they were excavators or scavengers, but most of them carried no burdens whatever.

"Why?" I asked myself.

The question puzzled me so much that I determined to find out for myself. All I had to do was to follow some of my nest-mates, who were outward bound. It was thus I learned that we had two kinds of cattle—one which lived underground, sucking the sap from roots, and the other which fed on the branches and twigs of plants above the ground.

The Aphids which lived in the open air seemed to be larger and more numerous than our underground herds. In the bright sunlight, I had a much better opportunity to study them. Their bodies were egg-shaped and were pale green in color. Each had six short legs and a tiny head which was equipped with a very efficient tool for boring through the bark and sucking out the sap. I noticed that some of them had wings while others had none. This surprising fact was accounted for when I saw one of the ant cow-punchers neatly amputate the wings from one of our flying cows. The operation was done so skillfully that the patient didn't seem to mind it in the least. This was the ant's method of branding her cattle and preventing them from escaping.

CHAPTER XI

Fighting Cattle Rustlers

I LEARNED that the duties of an ant cattle herder were numerous, varied and arduous. Not only did we have to "milk" our charges regularly and provide them with comfortable shelter, but we also protected them from their natural enemies and acted as nursemaids for their young. We even had insect prototypes of "cattle rustlers" to contend with.

Our colony, which must have numbered at least a hundred thousand, owned several herds of Aphids. The one which fed on plants located close to the nest were carried one by one into the formicary each evening. Each morning they were again lugged out into the open air and were placed on the most succulent branches. When the feeding plants were at a considerable distance from headquarters, the ants saved themselves the work of toting their charges back and forth by building tents into which they drove the Aphids at night. Constructed of fragments of wood fiber, matted together into a sort of felt, these insect cow-sheds provided warm, comfortable homes which were impervious to rain.

Even here, the ant guardians took the most solicitous care of their cattle's brood. As soon as any eggs were laid by the Aphids, they were immediately picked up by the ants and were carried inside the formicary, where special chambers were reserved for them. The nurses who attended the Aphid eggs took better care of them than they did of the young ants. This explained to me one of the mysteries which puzzled me when I was an amateur gardener. Even though the human beings who own the plants may succeed in wiping out an entire generation of Aphids their progeny usually appear on the scene the following spring, thanks to the protection they have received from their friends and owners—the ants.

I became very much attached to the ant cows. They seemed such droll, care-free, happy-go-lucky creatures. One of them in particular, which I loved to watch, had all the comedy sense of a successful cow. She always attacked her work with boisterous enthusiasm. When she was sucking the sap from a tender branch, she would cock her head in the most roguish fashion and would stick her two hind legs straight up in the air. The way she manipulated her legs reminded me of a famous comedienne of the stage and screen, and I promptly christened her "Charlotte Greenwood."

Once when I was at some distance away from Charlotte, busily engaged in "milking" honey dew from one of her companions, I looked up just in time to witness a tragedy. With marvelous agility a horrible creature, pale yellow in color, with a black stripe running down its back, darted out from under a leaf and seized one of the Aphids in its powerful jaws. It didn't attempt to chew or swallow its victim, being content with sucking all the life juices out of the hapless louse. Within what seemed but a few seconds there was nothing left of the Aphid but a hollow shell of chitin. I afterward learned that the assassin was a lace wing larva, commonly known as an Aphid Lion.

As quickly as I could, I hurried toward Charlotte to warn her of her danger, for she was but a short distance away from the scene of the murder. But before I could reach her, the lion dropped its kill and made a vicious snap at her. Evidently she had received some intimation of her peril, for she gave a comical sideways jump and the larva's spring fell short. At the same instant she discharged from two tubercles protruding out of her body a sticky secretion which completely covered the face and forceps of the lion.

An occasion of this sort was of course no time for comedy and I am sure that Charlotte's sole thought was to defend herself in the only way she knew how, but to me the episode was one of the funniest situations I have ever seen.

Surprised and disconcerted by this unexpected attack from his intended victim, the lion retired and tried to wipe the rapidly hardening secretion from its face. It reminded me for all the world of a fat and unpopular movie "heavy" who has just been decorated with a gooey custard pie.

Funny as it seemed to me, that slapstick comedy trick spelled the doom of Mister Lion. Attracted by the unusual vibrations of the twig on which all this took place, one of the ant guardians rushed at the larva and sunk its mandibles in its neck.

Ordinarily, because of its exceptional agility and its terrible jaws, one of these Aphid Lions would be more than a match of a single ant. But, thanks to Charlotte's strategy, the would-be murderer became the victim. By the time I arrived on the scene, its body was being torn to pieces by the other ant cowpunchers which had hastened to the rescue.

During the short time I was among the Honey Ants, I witnessed many such battles and participated in two or three of them. Whenever we succeeded in locating one of these murderous Aphid Lions, several of us attacked it at once and we never failed to slay the monster. Before we put them out of the way, however, they usually took frightful toll from our herds of Ant Cows.

One of my comrades was remarkably skillful in apprehending these criminals. Her methods would do credit to a scientific human detective. Whenever she came across the sucked-out shell of an Aphid, she set out to trail the murderer. Sometimes, when the body of the victim had fallen from the branch to the ground, the Ant Sleuth needed nothing more than a drop of aphid juice (corresponding to blood) as a clew to the identity of the assassin. With inexorable patience, she would search among the twigs and leaves until she located her quarry, then she would enlist a handful of ant deputies and would lead them in lynching the culprit.

Because of aptitude in catching criminals, I dubbed this ant, Miss Sherlocka Holmes.

Sherlocka also led in the work of eliminating other criminals besides the Aphid Lions. Like human cowpunchers we ants had to contend with cattle rustlers belonging to our own race.

So crafty were these thieves that it was some time before we discovered their presence. Our first inkling that we were being robbed was when we tried to "milk" a herd of Aphids which we had set out to pasture near the tips of some branches at a considerable distance away from our nest. Time after time, when we came to them and stroked them in the usual way we found that they could give us only very small amounts of honey dew, when they should have had a plentiful supply.

We also noticed that the size of this particular flock was decreasing very rapidly, yet there were no dead bodies or other indications that our cattle were being killed by Aphid Lions. So long as we remained near the Aphids nothing happened, but when we went away for a while to attend our other flocks and then returned we always found some of the Aphids missing and the rest of them drained of their honey dew.

Sherlocka took upon herself the task of solving the mystery. Noticing that she remained behind after all the other Honey Ants had departed, I decided to stay with her. Following her example, I crawled up on a leaf which was a few inches away from the Aphids' feeding ground. There was a brisk wind blowing in a direction which carried our scent away from the pasture. We could plainly distinguish the sweet, pleasant smell of our cattle as they sucked contentedly on the tender twigs.

Suddenly an unmistakable ant odor was wafted to our antennae. But it was the smell of ants belonging to an entirely different race from ours. Crawling to the edge of the leaf, I peered over. There they were sure enough! About a dozen of the Ant Rustlers were busily engaged in "milking" our cows. When they had extracted the last drop of honey dew, they scampered off, crossing to another shrub by means of a branch which hung over and touched the bush on which our cattle were feeding. The last two to leave picked up an Aphid apiece and carried them off.

This was too much for Sherlocka. Without running for help as she usually did when she discovered an Aphid Lion, she rushed along the branch and made a vicious attack on the vanguard of the rustlers. I was right behind her and I managed to hop on the back of one of the Aphid stealers. Had the rest of the band turned to fight, Sherlocka and I would probably have been slaughtered, but they evidently thought our entire tribe was back of us, for they retreated hurriedly, leaving their two comrades to their fate.

Though the rustlers were much bigger than we, Sherlocka and I made short work of our adversaries. Our victory was largely due to the unexpectedness of our attack and to the fact that the rustlers didn't have sense enough to drop the Aphids which they held fast in their mandibles until we had killed them. Strange to say, the two lice didn't seem to be hurt in the least. As soon as the smoke of battle had cleared away they nonchalantly inserted their sucking tubes into the branch on which they were standing and proceeded to wave their hind legs about as if they were glad they were still alive.

After that we kept ten or twelve of our "cowgirls," including Sherlocka and me, constantly on guard over that particular herd. Several times the rustlers made their appearance, but as soon as they caught our scent they would beat a hasty retreat. They didn't seem numerous enough or bold enough to put up a real battle for the possession of the plant lice. Though the Aphids were in one sense wild creatures that anyone had a right to kill or to use, there seemed to be a clear understanding that this particular herd belonged to us by right of original possession. The rustlers knew that their raids had been illegal and for that reason they apparently didn't feel justified in attempting to dispute possession of the cattle by means of mass warfare.

CHAPTER XII

The Ant That Used a Tool

ONE day, after one of these half-hearted attempts at rustling on the part of the alien ants, my curiosity got the better of me and I did a very reckless thing.

I followed the rustlers to their home!

Fully aware was I of the risks I was taking in thus venturing single-handed into the enemy's territory.

Had I been caught anywhere near the home of the other ants I would have been executed on the spot as a spy. Fortunately the wind was in my favor, blowing full in my face, so that the ants ahead of me had no way of knowing I was following them. I had expected them to climb down the trunk of the shrub to an underground nest similar to all the other ant homes I had seen, but I learned that this particular species of ant built its nest right in among the branches.

Soon we came to a large leaf which was swarming with ants. I selected a position where I could see and smell well without being seen or scented by them. What I witnessed then was made up of a combination of dim, imperfect visual impressions together with very clear "smell-pictures." Several of the ants clung together in a line, as children do when they play "London Bridge is Falling Down." With her two forelegs, each ant grasped the body of the one in front of her, until a chain several inches long had been formed. Then the foremost ant took hold of the edge of the leaf in her mandibles and hung on for dear life. Slowly the line behind her backed away, all the insects pulling together until the leaf had been curled into a tube. As the distant edge was drawn close it was grasped in the mandibles of a row of ants who were standing side by side on the leaf to receive it.

Then came the most astonishing sight I have ever seen. Working from the inside, one of the ants started to move back and forth across the place where the edges of the leaf were being held together. After she had made several trips back and forth along the leaf, I saw that the joint was being made fast by strands of fine, silky thread. At first I thought the ant was spinning this thread, just as a spider does, but I soon saw that the silk was coming not from her own mouth but from something she was holding between her mandibles. When she came to the end of the leaf that was close to my hiding place I was able to find out what this object was. It was a full grown larva —an ant grub which had just reached the point in its development when it was ready to spin its cocoon!

Holding this larva in her mandibles, the ant weaver squeezed it gently, forcing it to spin its silk. Thus she was using one of her baby sisters as a combined distaff, spinning wheel, and shuttle.

After she had passed back and forth across the seam repeatedly she threaded the larva in and out in such a way as to weave a strong fabric which held the edges of the leaf firmly together.

So absorbed had I been in watching the Weaver Ants, that I did not notice that the sky had become clouded and it had begun to sprinkle. Suddenly the heavens opened and the rain came down in torrents.

I was almost tempted to make a rush for the protection of the Weavers' leaf home, which I had just seen them construct. But I knew instinctively that I would be torn to pieces the moment I came within reach of their murderous mandibles, so I refrained from acting on this foolish impulse. It was imperative for me to get back to the nest of the Honey Ants as quickly as possible, that was clear.

But how was I to accomplish this?

Knowing that I was leaving a strongly scented trail behind me wherever I walked, I hadn't felt the slightest fear about wandering so far away from home. But now the heavy rain had obliterated all traces of my footsteps, I became somewhat concerned about finding my way back.

Like a horseman who had lost his way and who gives his steed the rein, depending on its animal instinct to bring him safely back to the stable, I decided to relinquish the hold which the human part of my brain exercised over my body and allow my ant nature and intelligence to have its unrestricted sway.

Without a moment's hesitation, my ant-legs carried me speedily on my way. The human segment of my brain didn't have the slightest idea where I was going, but the ant seemed absolutely sure of itself.

Though I made no effort to control the movements of my body, I did keep my human consciousness on the alert. I thought at first that my ant-nature would try to find its way back by remembering in reverse order the path I had taken on the outward journey. I soon became convinced, however, that this method was not used. Had I followed the same path on the way back, I would certainly have recognized at least one or two landmarks, but such was not the case. On the contrary I felt certain that I was returning by a different and much shorter route.

It seemed but a few seconds before I found myself at the opening of our nest.

The only way I can account for my astonishing success in finding my way back is that I seemed to carry somewhere in my body an inductive compass which automatically pointed out to me the direction in which I was to move. Naturally my path, leading along twigs, across leaves, down branches, over grass blades and around stones, was far from straight. Yet I seemed to keep in my mind constantly the consciousness that the nest was in a certain direction from me, and thither I went, arriving at my destination without the least bit of searching.

Within the nest there seemed to be a lot of activity going on. Noticing the disturbance, I feared that the lower levels of our formicary had been flooded by the rain, but such was not the case. Most of the excitement seemed to be centered around the winged members of our colony. During the last few days hundreds of these aviator ants had been wandering around in the underground passageway, but they had not been permitted to leave the nest. There were two kinds of them. By far the greater majority were only slightly larger than the rest of us, but were quite different from the workers in structure. I noticed particularly that their eyes seemed to be very well developed and I guessed that they were the male ants.

The other winged ants, which were fewer in number than the males, must have been at least three times as large as their brothers. They were the true females who were destined to become the queen mothers of future colonies.

Hitherto these winged inmates of our city had been very docile. They had been perfectly content to remain inside the nest, where the workers had fed them, cleansed them, and attended to all their other needs. But now they seemed impatient to be off. In spite of the rain and the coldness of that stormy afternoon, they kept running about, struggling to get outside the nest. This the conscientious and wise workers would not permit. Gently but firmly, they caught hold of their over-zealous sisters and brothers and restrained them, dragging them back into the lower chambers of the nest.

ON the following day, which was warm and sunshiny, the same performance was repeated. The workers, who were usually so diligent, didn't perform a lick of work that day. They completely neglected their herds of plant lice and spent the entire day in running excitedly about the nest, tenderly cleansing the winged ants, feeding them and caressing them. As on the previous day, the males and virgin winged females were like a great herd of fire-horses, pawing the ground in their eagerness to be off; but this the workers, who seemed to control the situation, would not permit them to do.

Naturally I participated in the excitement and did my share of grooming and provisioning the would-be aviators. I seemed to have a feeling within me such as a baby feels a few days before Christmas. I knew that something important was going to happen soon but that the time was not quite ripe yet.

It wasn't until the second day after the rain storm that the winged ants were allowed to depart. When the sun had risen high enough so that the ground was delightfully warm, the guardians of the nest released their prisoners and all of us, males, females and workers, streamed out of the nest.

Immediately the flyers took to the air. From what Doctor De Villa had previously told me about the ants' nuptial flights I, of course, understood the significance of this momentous event. I assumed that the weddings would take place between brothers and sisters from the same family, but I soon learned that even among ants with their strictly "closed corporations" and their jealousy in preventing strangers from entering their cities, Nature had provided a way for keeping the race strong and healthy through the advantages of interbreeding.

As soon as our sisters and brothers had hopped off many of them flew in different directions. Those who remained flying overhead were soon joined by other flying ants who were of the same race as ours but who must have belonged to other formicaries. It wasn't long before the air was full of them. Though many of those from our nest had departed, the swarms overhead were much more numerous than the entire delegation which had been hatched in our nurseries. They were like a huge swirling cloud, so densely packed that they almost blotted out the light of the sun.

I was utterly at a loss to account for this remarkable gathering of courting ants who must have come from several different nests. With no means of communication between the various ant cities, how did they all know that this day, of all days in the year, had been authoritatively set aside to be the great wedding day? This is one of the mysteries that no man has ever been able to solve. Even with the advantage I had of being on the inside, I didn't have the slightest inkling of how it was accomplished. All I know is that I, like all my fellow workers, was absolutely sure when the appointed time had arrived.

Most of the marriages took place in the air. I saw one of the married females alight on the ground near our nest. The first thing she did was to tear off her wings. She seemed to understand that she would have to spend the rest of her life underground where her wings would be of no use to her. She crawled away until she was several yards from our nest. Then she dug a hole in the ground with her mandibles, crawled inside of it and pulled the dirt around her until she was completely buried. Within her body she carried all the materials necessary for starting a community of over half a million inhabitants.

On the day after the celebration of these wholesale wedding ceremonies our colony had a disastrous experience with a female who tried to establish herself as queen in an entirely different manner from that practised by the mother ants of our own species.

I happened to be near the opening of our nest when she first made her appearance among us. By her wicked, sickle-shaped mandibles I recognized her immediately. She belonged to the dreaded tribe of Amazons. As soon as she came close to the opening of our nest, five or six of the Honey Ants who were nearby rushed at her. Though they were less than one-third her size and were not nearly so well armed, they attacked her in a most heroic manner.

Knowing as I did how terrible those long pointed mandibles could be, I trembled for the safety of my comrades. Much to my surprise, however, the alien did not retaliate. Instead she stroked her tiny antagonists affectionately with her antenna and offered them food which she had regurgitated from her well filled crop. It was quite evident that she was trying to placate them. She wanted them to receive her as a friend.

The vibration of the struggle had attracted more of the Honey Ants, who swarmed out of the nest and joined in the attack. Ignoring the gestures of seeming friendliness on the part of the interloper, the defenders of the formicary seemed to understand that they had to deal with a deadly enemy who must be prevented from entering their sanctuary at any cost.

Despite their numbers and the valiant way in which they attacked her, the small, peaceful Honey Ants were no match for the monstrous Amazon. Gently but firmly she forced her way inside the nest, with dozens of the small Honey Ants clinging ineffectually to her body.

Remembering that my rôle was that of war correspondent and historian, I did my best to observe closely everything that subsequently happened. I realized that a very momentous event was taking place and I resolved not to miss any of it. Consequently I remained as close as possible to the Amazon without doing anything to oppose her. During the succeeding happenings, I carefully kept beyond reach of her murderous mandibles, but at the same time I followed her all about, staying within smelling distance so that I could observe everything she did.

It soon became apparent that the Amazon was trying to locate our nursery. Since our brood was near the surface it didn't take her long to find a chamber in which several hundred cocoons were stored. The alien female immediately took possession of them. Once she had reached this objective, her tactics changed. Instead of continuing with her efforts to calm and placate her adversaries she suddenly turned on them and attacked them furiously. Her method was horribly efficient. All she had to do was to seize the head of one of the smaller ants betwen her sharp pointed mandibles and her victim was completely out of the picture with its brain pierced. In this manner she attacked each of her antagonists in turn until she had slain all of them.

BY this time more ants had come running from the other parts of the nest. When they sized up the situation they realized that there wasn't much of a chance to kill the intruder so they contented themselves with trying to carry off some of the cocoons.

This strategem seemed to make the Amazon furious. In the universal languge of the ants she rebuked the rightful owners of the brood.

"You dirty thieves!" she denounced us. "These children belong to me! How dare you steal them away from me?"

It was quite apparent that she thought she was absolutely within her rights. Instead of realizing that she herself was a murderer and a child stealer, she actually looked on the rest of us as criminals, who were trying to deprive her of property that lawfully belonged to her.

After the Amazon had killed several more of the Honey Ants because they had the temerity to come near the brood, those of us who were left decided that there was nothing to do but surrender that particular group of children to her. If she had been contented with that it wouldn't have been so bad, but we soon found that she had even more nefarious designs against our colony.

It wasn't long before my sister workers, brave as they all were, became so afraid of the horrible, sickle-shaped weapons of the Amazon that they no longer attempted to restrain her movements but gave her a wide berth whenever she came near. The interloper became more and more arrogant. No longer did she remain in the nursery where she first revealed her villainy. She soon had the undisputed run of the whole formicary. As she strutted through the passageways in search of more children to steal she attacked and killed every Honey Ant who came in her way.

On one of these trips of exploration, she located the holy-of-holies, the royal chamber where the Queen of the Honey Ants lived.

Without a moment's hesitation, she crawled over the large body of our Mother and perched on her back! Here she suddenly became gentle and friendly again. At least she pretended to be friendly, stroking our Queen with her antenna and licking her body affectionately.

This seemed to produce an immediate change in the attitude of the Honey Ants. If this newcomer was a friend of their beloved Mother she must be all right. No longer did they shun her or try to harass her. Instead, some of them actually crawled up on her body and began to cleanse and caress her. Others approached her fearlessly from the front and offered her choice droplets of honey dew which they regurgitated for her benefit. She accepted all these attentions and gifts as if she regarded them as her rightful due.

I don't think any of my sisters had the slightest idea of how far the treachery of the alien queen would go. Because I knew from experience how unreliable the Amazon People were, I didn't share in the trust which my comrades now seemed to place in her. That my suspicions were well-founded soon became apparent.

While she was perched on the back of our Mother, seemingly caressing her in a very affectionate manner, she was really engaged in a stealthy and treacherous act. Slowly and cautiously, she was sawing away at the neck of our legitimate Queen. On the day after her arrival in our city she had completed her unspeakable task. Our Mother lay dead, with her head completely severed from her body.

Even then, my sister ants didn't seem to have a clear understanding of what had happened. It was a calamity, to be sure. Their dear Mother and Queen was dead, but fortunately there was another fertile Queen to replace her.

"The Queen is dead! Long live the Queen!"

How often has this same drama been enacted among human beings! Now it had taken place in the kingdom of the Honey Ants!

From the account I have just given, it may sound as if the acts of that Amazon Queen represented the lowest degree of baseness, treachery, crime and inhumanity. Through a series of wholesale murders, culminating in the assassination of the legal ruler, she had succeeded in usurping the throne and placing herself at the head of a great people.

"Monstrous!" is the natural human reaction to such a story. "Only a despicable insect could act like that!"

But wait! Just take a glance over the pages of history. And you don't need to confine your search to the stories of savage and barbarous people. Even among those who considered themselves to be highly cultured and civilized—even among those who were supposed to be devoutly religious—we can find numerous examples which would make the crimes of the Amazon Queen look tame in comparison.

Her sins at least were committed against strangers and aliens; but the worst crimes of human beings have been perpetrated against their own kin. To gain and retain their thrones, human monarchs have murdered their brothers and sisters, their mothers and fathers—and even their own children. Thus it became clear to me, that even in their most despicable acts of violence the ants resemble human beings but with this important difference: men have perpetrated felonies that were much worse than an insect ever thought of.

It was not until I had deliberated the matter for some time that I realized the full significance of this coup on the part of the Amazon Queen.

Now that she was in full possession of the throne—now that she had been accepted by all her future subjects—now that she was being pampered, caressed and fed just like a legitimate queen, she was sitting pretty for the rest of her life.

Soon she would start the most important work of all—that of laying eggs and producing an army of young Amazons. In the meantime all her needs would be taken care of by the faithful Honey Ants whom she had tricked into serving her.

When her own brood hatched out, they would be incapable of looking after themselves. It would be necessary for the Honey Ants to feed and nurse them. Without their new Mother to keep renewing their depleted numbers, that particular colony of Honey Ants would soon be wiped out. Since the Amazons were only good for fighting, their only hope was to raid other nests, stealing the young and thus obtaining new supplies of slaves to wait on them. Then would follow the sort of life I had experienced among the Slave Makers. There would be carousing and dissipation made possible by the golden haired Bootleggers and interrupted only when they engaged in games or marauding expeditions against other ants.

CHAPTER XIII

Imprisoned!

THOUGH the death of our Queen Mother was a sad blow to us, we all took our loss philosophically. We carried her body out of the nest and buried it with due reverence. Then we went back to our pastoral life of herding, "milking" and looking after our Aphid Cattle. I realized that the time had now come for me to forsake my newly made friends and return to my human body. But before giving the prearranged signal to Doctor De Villa, I did a very foolish thing. Hitherto I had not participated to any great extent in the "milking" work. My activities had been confined principally to watching the others and helping them defend our flocks against enemies. An ant, I learned, doesn't need to eat very much to keep alive. Nearly all the food I had consumed was given to me by my sisters who were always glad to regurgitate a droplet for me whenever I asked for it.

I didn't want to leave the Honey Ants without finding out more about this "milking" process. What I learned is this: Wild plant lice are in the habit of shooting their excretions at some distance from their bodies. Usually it fell on the leaves of the plants, where it soon dried, forming the scales of manna which Doctor De Villa had described to me. But after they were adopted by the ants these Aphids changed their habits completely. Instead of expelling the honey dew forcefully, they seemed to hold it back, storing it in their bodies until the ant dairymaids came to collect it.

When I emulated my sister ants and stroked one of the Aphids with my antenna, I noticed that a tiny drop appeared at the end of the "cow's" body. She must have squeezed it out very gently for my special benefit. All I had to do was to lick it off with my tongue and deposit it in my crop. So interested did I become in this occupation that I didn't notice how much of the sweet tasting fluid I was putting into my collective pouch. It wasn't until the fading light told me that night was approaching that I thought of quitting my work and returning home.

Much to my distress, I discovered that my gaster had become so large and so heavy that I could hardly crawl. Without realizing what I was doing I had kept pouring honey dew into my crop until it had swelled out to several times its normal size. When I finally dragged my weary body to the opening of the formicary, the gate keepers greeted me with intense excitement. Instead of permitting me to pass after the usual exchange of caress, they took hold of me and started leading me along the main passageway of the nest. Further and further they descended, pushing and dragging me along with them, until we had reached one of the deepest portions of the nest. Here they conducted me into a vaulted chamber which I recognized immediately as the room of the living honey jars. Hanging to the ceiling like clusters of round berries were the distended bodies of the repletes who provided the receptacles for storing the colony's reserve food supply.

Then, for the first time, the signficance of my surprising reception came over me. Because of my thoughtless diligence in collecting a superabundance of honey dew, I had stretched my abdomen until I was almost as large as one of the repletes. Noticing this, the guardians of the nest had forthwith elected me to spend the rest of my life hanging to the ceiling of this underground chamber!

At first I became panicky. I struggled and tried to get away. It was no use, however. My captors were too numerous and too strong for me. After restraining me gently for a while, they began to get rough. One of them even gave me a painful nip with her pincers. I then decided that the wisest plan was to submit for the time being, depending on my resourcefulness to find some way to escape later.

It occurred to me that everything had happened for the best after all. How could I understand the ant nature until I had shared in all their experiences? The life of a replete was as typical of the ant people as any other vocation. I resolved, therefore, to spend at least a day among these living flagons to see what their existence was like.

Without knowing it, I was like a white man who, attracted by the care-free life of a South Sea Islander, tasted the lotus of forgetfulness and "went native."

To the educated human being there would be something revolting—almost terrifying—about the thought of being forced to pass one's entire existence hanging to the roof of an underground cavern. But, singular as it may appear, I found the life of a replete anything but disagreeable. On the contrary, it was so enjoyable that I wanted to do nothing else but remain there. None of my companions seemed at all dissatisfied. From the interchanges of thoughts which I had with the others as we hung there side by side, I gathered that they all felt as if they were very highly honored. In some ways we were even better off than the Queen. Like her we were protected against harm by being kept in a carefully guarded portion of the city. We were also constantly being brushed and licked and stroked and petted and kissed by our solicitous sisters who looked after us with the most tender care.

But most wonderful of all, we repeatedly experienced the ecstacies of regurgitation. Since our work was confined entirely to receiving food from those who had plenty and subsequently giving it up, drop after drop, to those who were hungry, we enjoyed the pleasures of regurgitation and all the petting and kissing that went with it ever so much more often than any of our less favored sisters did.

After a few hours of this delectable occupation, my ant nature nearly got the better of me. I had tasted the lotus. I had gone native. I had almost lost my white man's heritage.

It is hard for me to describe the terrific mental struggle I went through before that tiny speck of human consciousness within my insect head gained control over the submissive, dutiful instincts that were deeply rooted in my ant-body. At last, however, my man-will conquered and I began to plan my escape.

The task which now confronted me was the hardest one I have ever encountered. Sneaking out in my present condition was absolutely out of the question. I tried it once but I had hardly dropped to the floor of the cavern before three of the workers came running to me. With the utmost tenderness, they brushed me and licked my body and stroked my head. Then they proceeded to crawl up the wall, dragging me with them until they had put me back in my original position.

Then I realized that my only hope was to disgorge the contents of my crop so that my body would return to its natural size. It was absolutely imperative for me to reduce and to regain my former sylphlike figure. I tackled this job with the desperate earnestness of a Hollywood star who has been told that she must lose ten pounds or have her contract canceled. For me to reduce myself back to normalcy was by no means as easy as it may sound. No matter how hard I tried I couldn't get rid of more than one tiny droplet at a time and there were many drops in my social stomach. I soon learned to distinguish between what I called the "put ants" and the "take ants." Since I was still able to move about to a certain extent while the other repletes remained motionless, it was possible for me to gain the attention of the ants who were looking for food and to get away from some of those who were trying to fill me up with more honey dew.

The most difficult part of this game was to foil the "put ants." Because I was the smallest replete in the suspended bunch they invariably made for me first. I used all sorts of schemes to avoid them. First I clung to one of the other honey jars, hoping to camouflage myself as a part of her huge body. Sometimes this worked and sometimes it didn't. When the forager detected my trick and insisted on forcing more honey dew into my body, I tried to crawl away. Invariably she followed me, urging me with stubborn persistence to accept the food she was offering me. Then I would pretend to be so dumb that I didn't understand what she wanted me for. This seemed to be the most effective plan of all. Most of the workers gave me up in disgust and unloaded their burdens of food into more willing receptacles.

By spending two or three days in dodging "put ants" and serving "take ants" I managed to reduce my shape to about one-half its exaggerated size. Picking a time when the lowered temperature of our home indicated that most of my nestmates would be enjoying their nocturnal rest, I dropped to the floor of the chamber. I quicky disgorged drop after drop of the honey dew still remaining in my crop, getting rid of it by rubbing my spongy tongue against the walls of the chamber. Luckily, the two guards who were always on duty outside the cave of the repletes were dozing, and I got past them without any difficulty.

Breaking into a brisk trot, I hurried onward and upward. I passed several ants on the way, but they seemed too sleepy to pay any attention to me. But as I came out into the main highway I got the scare of my life. Whom should I run into but Miss Sherlocka Holmes.

She recognized me immediately, of course, and accosted me. Then followed an animated conversation carried on in the ant language of gestures and taps. Here is a free translation:

"Hello, there!" Sherlocka greeted me. "What in the world are you doing out here. You are a honey jar now. Don't you know that it is absolutely against the law for a honey jar to leave the storage chamber?"

"S-s-s-h-h-h!" I responded in the most mysterious manner I could assume. "There's been dirty work going on at the cross-roads. I found out that some outsiders have been stealing honey dew from our repletes. Can you imagine the nerve of the scalawags! In order to catch them, I disguised myself as a honey jar and spied on them. That's why you thought I was one of the repletes. And I found out plenty, believe me!"

I had Sherlocka's undivided interest after that. She forgot all about her duty which bade her force me back to the storage chamber.

"Gosh! That must have been thrilling!" she gesticulated. "Did you catch the robbers?"

"I haven't caught them yet, but I'm on their trail! Believe me, I'm on their trail!"

"Let me help you!" was her eager rejoinder.

"Sorry, Sister, but I'm afraid that won't do. You see, this is a one-ant job. My only chance of running these babies down is to go it strictly on my own. But I must be on my way or I may lose track of them. Toodle-oo, my dear!" And I scampered off, leaving her standing there with her mouth wide open.

I realized that the most perilous part of my attempted jailbreak would be at the portal of the nest. Here I knew there were always several guards on duty who never relaxed their vigilance. The first idea that popped into my head was to make a wild dash for the exit, depending on the advantage of surprise to carry me through. On reflection, however, I concluded that such an attempt to crash the gate from the inside would be too risky. In case the opening happened to be blocked by the bodies of the gate keepers, as was usually the case, I would only betray myself if I dashed madly among them.

The plan which I finally adopted was to hide in one of the nurseries close to the main entrance until dawn. I waited until the first of the ants began to file out of the nest on their way to the Aphid pastures. As unobtrusively as possible, I joined in the procession.

My clever attempt to deceive the guards didn't work, however. They were extremely efficient, those vigilant gatekeepers of ours. It was their duty not only to keep aliens out of the nest, but also to prevent the escape of all those who were supposed to stay inside. I have known several doormen of exclusive clubs, who had memories for names, faces and occupations that were almost inconceivable, but none of them could compare with the doorwomen of our Ant Organization.

Though there were many thousands of members in our ant club, the gate keepers seemed to know intimately the identity and occupation of every individual. They recognized me instantly, in spite of my drastic campaign of reducing. At the same time, the transformation in my appearance seemed to puzzle them. They gathered around me, examining me with their antenna and conversed with each other excitedly.

"It's now or never!" thought I.

Like a football player I ploughed through the line of guards, straight-arming them with my forelegs and scattering them to the right and left. Luck was with me. I was out in the open before the astonished ants could recover themselves. Instinctively I ran with the wind and dodged under the first stone I could find. By the time the doorkeepers had reached the opening they could neither see nor smell me.

With my body quivering from my strenuous exertions I lay motionless under the stone until I had recovered my strength. Then I crawled out and reconnoitered. I soon found a spot of bare earth fairly close to the nest but at some distance away from the path which the cowpunchers followed on the way to their herds.

Here I waited for what seemed like centuries. It couldn't have been more than a few hours, however, for the shadows of the grass blades had shortened only slightly when I felt the welcome clasp of Doctor De Villa's tweezers pressing against my sides. According to the prearranged signal, he lifted me up and then placed me on the ground again. Needless to say, I remained perfectly motionless. The next thing I knew I was on my way back to the laboratory.

CHAPTER XIV

Back to the World of Men

THE newspapers of Southern California had printed an enormous amount of publicity concerning my disappearance. Naturally, my reappearance created a huge sensation. For several days I was beseiged by reporters, sob sisters and feature writers. But, since Doctor De Villa had asked me not to divulge any of his secrets, I could not give the newspapers a particle of information.

They used every means they could think of, including the third degree, to wring a statement out of me, but I kept my own counsel. One of the most persistent of the newspaper chaps appealed to me in this wise:

"It's your duty to tell us what happened. Our public—the thousands of American citizens who read our paper—demand an explanation of your conduct, and they are entitled to enlightenment."

"Very well, then," I pretended to agree. "Tell our public that I was kidnaped by a man named Steve, who was assisted by a woman named Rose. During the last three weeks they kept me imprisoned in a shack just across the border in Mexico. Finally I made my escape, found my way back to San Diego and here I am."

I said this so solemnly and so seriously that for a moment I had the reporter guessing.

He looked at me out of the corner of his eye and said, "Say, listen, young fellow, are you trying to kid me?"

"Certainly not, sir. I know better than to try to kid a smart newspaper man like you."

"Oh, yeah?" he retorted. "Well, if you've got to lie about it, why don't you think up a lie that's original?"

Until I completed this manuscript there was only one person to whom I related my true story. That person was Alice Hill. When she found out I was still alive she really seemed glad.

"There's been a tremendous change in you, Kenneth," she told me. "And if you don't mind my saying so, the change has been very much for the better. I'm so glad that you have relinquished all those terrible ideas about Atheism and things like that."

"And are you sure you like me a little bit now?"

"Of course I do. I always did like you, even when you talked in such a horrid way. But you're nicer now—lots nicer, and I'm glad."

"If that's the case, will you start wearing my frat pin again?"

(*Continued on page* 279)

Water-Bound World

By Harl Vincent

Author of "Venus Liberated," "Once in a Blue Moon," etc.

IN our present state of political corruption, it would seem a relief to go off to some other planet and colonize anew—providing, of course, that the chosen planet was not already inhabited by intelligent beings much further advanced than we are. But, in this short scientifiction gem of interplanetary travel, Mr. Vincent sounds another warning—corruption, too, can travel and perhaps be joined with peers of a vastly stronger menace, and uniquely strange—as witness what the travelers in this story meet with en route to Saturn.

Illustrated by MOREY

CHAPTER I

Capture

WITH ever decreasing velocity the ethership *Mercurianic* circled Japetus, Saturn's eighth satellite. At each convolution she drew nearer to the ominously tossing clouds which enveloped the body. The great vessel's rocket tubes gave forth no sound.

A tense silence pervaded the navigating cabin. Through the thick glass of the forward port Captain Jornas Boe gazed fixedly at the sunlit billows beneath them. Ridge Color, the pilot, was a rigid hunched figure at the control keyboard.

"What altitude, Mr. Coler?" the captain asked.

"Fifty-two thousand, Sir." Ridge straightened his slim lithe body and turned expectant eyes on his superior.

Captain Boe stepped wearily to the optophone and flipped its lever, The alert but unsmiling visage of the Venerian chief engineer flashed into view on the disc.

"Let me have the concentrate quantities, Mr. Nad." The captain's voice was mild, but a careful observer might have detected in it a strained quality of inflection and would certainly have noted the cool arrogance on the face pictured in the disc.

"Tank number three is half full, Sir,"—with a queer mixture of insolence and respect, "And there's eight hundred pounds in number one. Do we make the landing?"

"We do not. We'll proceed with the work as we've started, if it takes us a terrestrial month."

The black brows of the chief engineer drew together ever so slightly and a curiously chill smile twisted his thin lips. "It can't be done, Sir," he protested, "My men are exhausted; unruly. We—"

"Enough!" Captain Boe's words snapped out like the lash of a whip. "We proceed as I have commanded." He shoved back the optophone lever with an angry gesture and the disc went blank. "We'll return to one hundred thousand feet, Mr. Coler," he told Ridge calmly.

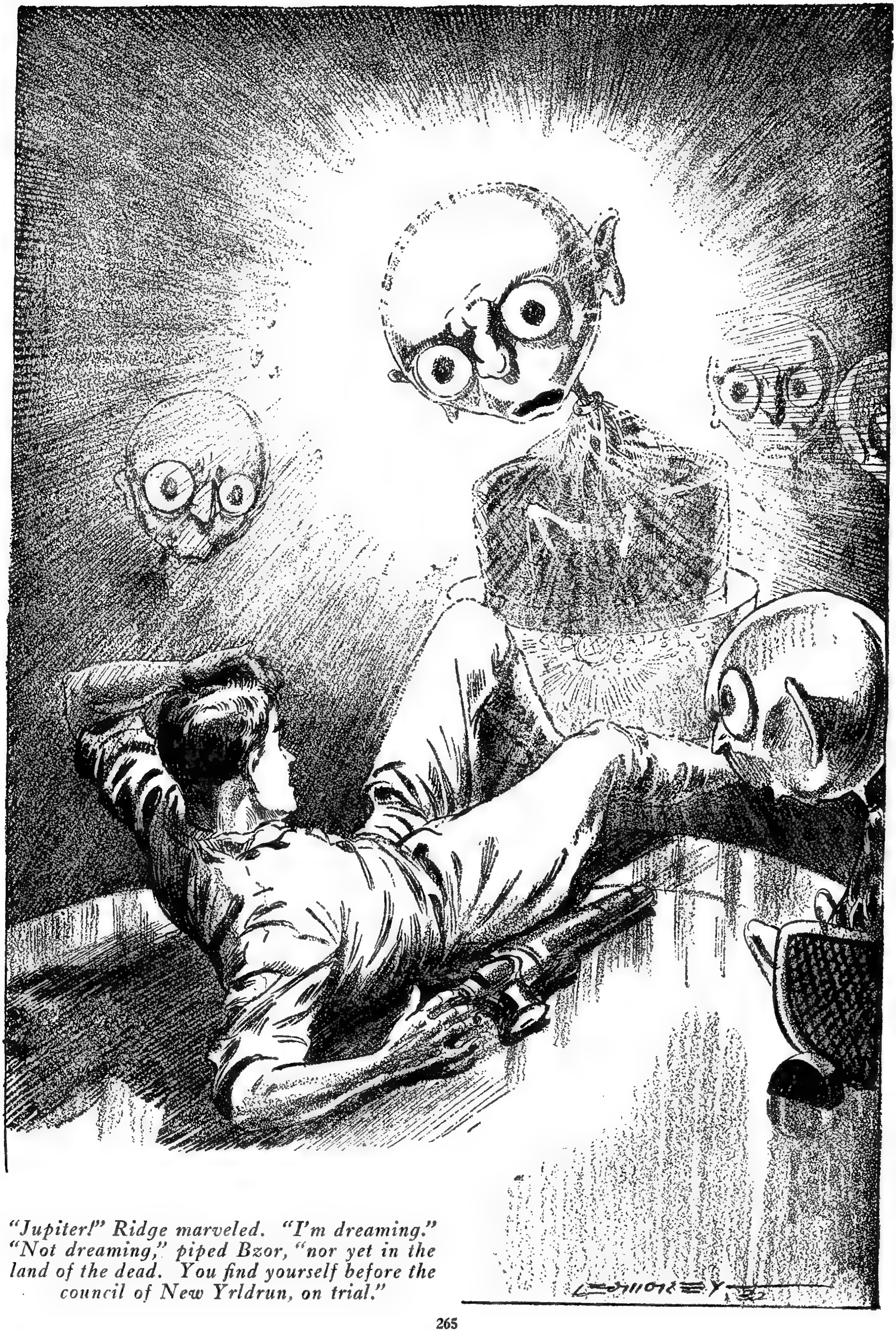
"Ay, Sir." The pilot depressed a group of keys and the vessel throbbed smoothly to the reaction of a series of staccato blasts from the keel rocket tubes. The tossing cloud surface fell rapidly away.

The stillness again became oppressive when the captain bowed his iron-gray head anxiously over the celestial chart.

Ridge Coler was appreciative of the dilemma faced by the captain. To make a landing on the satellite Japetus was strictly prohibited by the Interplanetary Commerce Commission. The body was ringed in red on the charts; no scouting vessel of the inner planets had been able to reach its reputedly dangerous surface. Loss of his papers and probable exile awaited that master of a passenger-carrying ethership who landed his vessel in defiance of the Commission's ruling.

But the *Mercurianic* was in trouble, having run afoul of a tiny planetoid or meteorite the day before. Her fuel tanks had been punctured, causing the leakage of most of the concentrated liquid explosive into the vacuum of space. With insufficient fuel to carry her the remaining distance of her journey from Earth to Saturn, she had been eased into the atmosphere of the nearest body — the forbidden satellite — where nitrogen and other elements needed in replenishing the supply of fuel were being extracted from the thin outer air.

It was slow and arduous work for the engineers, since the fuel consumed hourly by the heating and oxygen apparatus, plus the amount used by the rocket tubes in maintaining their altitude, was almost as great a quantity as could be manufactured during the same period of time. Zarko Nad, iron-fisted chief of the engine rooms, claimed his men were objecting. And,



"Jupiter!" Ridge marveled. "I'm dreaming." "Not dreaming," piped Bzor, "nor yet in the land of the dead. You find yourself before the council of New Yrldrun, on trial."

hourly, his insistence that they land on Japetus became more vigorous.

Privately, Ridge looked with longing eyes at the mist-shrouded satellite. Here waited mystery, adventure. The old urge was strong upon him; this prosaic job of piloting was growing irksome, and he was itching to try his hand at setting the big liner down on the surface of this body which was declared impossible of safe approach.

But of course there were the passengers. And the captain's strict accountability; his sworn duty and the duty of his subordinates. It was out of the question that any course other than the present one be followed.

Captain Boe turned a haggard face toward his pilot. "I've been thinking of the possible depth of this cloud layer," he muttered, as if thinking aloud. "There is no record you know of, Mr. Coler?"

"Only that of Vorn Jare, of the Martian Patrol. He was within a mile of the surface in 2114—"

"Yes, I remember. And still he found himself in the dense vapor. It is no wonder that landing is prohibited, and yet—"

"You're thinking of attempting it, Sir?" Ridge's exclamation was fraught with excitement.

"Certainly not, my boy. But sometimes—er—eventualities, you know. Oh, what in the devil am I talking about?" The captain turned abruptly to view once more the tortured cloud covering of Japetus.

Ridge stared in astonishment at the erect stocky figure. He was keenly aware of the captain's concern; he knew of the restlessness of the passengers and of the mutterings in the crew's quarters. But that the captain was dubious of the outcome, he had no suspicion. In the dark days to come, Ridge was to remember his words—and his courage.

A heavy step sounded behind him and Ridge turned to stare into the faintly smiling countenance of the chief engineer. Zarko Nad's huge bulk filled the doorway as he stood for a moment coolly surveying the scene in the navigating cabin. Then he was advancing on the captain, catlike in his movements.

"Boe," he rumbled, "Know how much we gained in the past hour?"

"Mr. Boe, if you please," the captain purred. But it was the purr of a tiger; Ridge saw the swelling of the veins at his temples and the tensing of the great chest muscles beneath his snug purple jacket.

"Ay—*mister* Boe," Zarko drawled with infuriating calm. "The gain was less than two hundred pounds. Of the seven hundred pounds of concentrate we manufactured, you used more than five to gain altitude. It is impossible, what you are trying to do—we've got to land."

"Rot!" There was no equivocation in the captain's clipped words. "Now, you listen to me: I know your men are growling—they're working on a long job. But work is what they're paid for, what you're paid for. Little though it may be, we're gaining—you admit it. And there's such a thing as duty, such a thing as law. The same law that forbids landing on this satellite makes me Master of this vessel, and Master I intend to remain. We do *not* land; we *work*. Get it?"

Ridge Coler drew in a sharp breath. Zarko's huge shoulders had hunched threateningly. There was a convulsive clenching of his great hamlike paws and he thrust a foot forward, lowering his head. The young pilot half rose from his seat. But Captain Boe's gaze, flinty and unswerving, held the determination of a man who would hold to his guns in the face of all argument —of a man conscious of his mastery.

The big Venerian subsided, but his voice was brittle as he asked, "Is this your final word, Sir?"

"It is."

Without further speech, but with flashing eyes that spoke volumes, Zarko Nad turned on his heel and vanished into the tubular passageway that led aft.

"I'm with you, Sir, if there's trouble," blurted Ridge.

'Thank you." The captain's gaze locked with the pilot's for a long, understanding moment. Then he smiled enigmatically and turned once more to his contemplation of the chart.

Ridge hunched low in the pilot's seat, his long legs raised and muscular arms enwrapping his knees. It was a habit of his when disturbing thoughts engrossed him, and he sat thus contorted for a long time. In his imagination he was dropping the *Mercurianic* safely through the cloud envelope, searching barren crags and arid plains for signs of habitation. Fanciful conceptions . . . impossible. . . .

They were again nearing the outer reaches of the misty shroud when the booming of the ship's bell announced the coming of the relief pilot. Untangling his jumbled limbs, Ridge gave over the controls and went aft.

KAL TURJEN, the deep-chested coppery-skinned Martian who was his friend and cabin mate, awaited him in the small cubicle they shared.

It was unusual that so great a friendship arise between Terrestrial and Martian as had come to these two. But Ridge, as a young lad, had been taken to Mars by his parents; his father had been one of the first American business men to settle there. Those were difficult days for alien youngsters on the red planet, and Kal, a trifle his senior, had taken Ridge under his wing and defended him throughout the trying initial period of Martian schooling, later joining him as partner in many youthful exploits and conquests. As adolescents, they remained fast friends; as men they had wandered together over most of the solar system in search of adventure. They were inseparable now.

Kal's black eyes squinted up at his friend through the curling smoke of the cigaret that adhered perpetually to his lower lip. "Any news?" he inquired.

"Zarka was up forward, arguing with the captain." Ridge stripped off his shirt and made for the soap and hot water.

Exhaling noisily, Kal watched solemnly the weaving of the muscles under the smooth skin of his friend's broad back. Then: "He's been stirring up things between decks, as well," he muttered, in English.

Ridge looked up from the wash bowl, surprised. Ordinarily they conversed in Sol-ido, the universal language of interplanetary travelers. "Think it means trouble?" he asked, likewise switching to his own mother tongue and lowering his voice.

"I'm sure of it. Zarko's been whispering amongst the crew all this watch. Lot of new men this trip, too —seems he knows 'em all."

"What kind of men? How many?" The young pilot dried his unruly thatch of red hair with savage swabbings of the towel.

Kal Turjen growled. "Imps of the canals! Every Martian below decks is with him; these cursed drylanders are ever mixed up in such devilment. And there's Rete Dovis, Nad's Venerian assistant. And a few roughneck Terrestrials. Probably thirty of them, all told."

Ridge whistled. "In other words, nearly every man Jack of the crew. Excepting only the upper-deck officers and—ourselves."

"Right." Kal lighted a fresh cigaret from the half-inch butt of the last, smiling grimly the while. "Seems like we're in for some of this excitement you've been yelling for."

Ridge's gray eyes were solemn and he vouchsafed no reply as he wriggled vigorously into a clean shirt.

The big Martian was booked as radiophone operator, and his duties were anything but arduous on a vessel whose transmitters were limited in range to million miles. Almost criminal, this niggardly economy of the owners; the *Mercurianic* would be able to summon help if only they might span the two and a quarter million miles to Saturn. Kal was contemptuous of the obsolete equipment, but at least there had been plenty of time to nose around down below. He had seen and heard many things which convinced him all was not well in the domain of Zarko.

As if to conform his suspicions, a muffled shriek came to their ears, seemingly from the passenger compartment. A babel of shouting; swift shufflings of heavy boots in the passage.

"They're at it already!" he gasped.

"Come on!" Ridge bellowed. The American burst from the cabin, well knowing that his bronze-hued friend would be on his heels.

A knot of grimy, sweating men swayed there by the bulkhead which separated the passenger compartment from the crew's quarters. Ridge caught a glimpse of gold braid on a purple cap and of a white face beneath, from which bulging eyes stared. It was Marrin, the first mate. A knife rose flashing and fell, and Marrin went down in the tangle. Shouting and cursing, his assailants fled into the main cabin.

Marrin was breathing his last when they reached him. "Zarko!" he gasped, "Gone forward . . . with his killers . . . the captain . . ."

The mate was dead. Ridge looked up into the fierce black eyes of his friend. "Jupiter!—it's worse than I thought. Kal, we must head them off—somehow."

They sprinted through the cabin, where little groups of hysterical passengers were gathered. A steward lay there, sprawled on the deck with a Martian karee knife projecting from his back. Two fidgetty and frightened old men were carrying the limp body of a moaning woman to one of the lounges. Scared faces peeped out from stateroom doors. Hoarse shouts could be heard beyond the forward bulkhead.

"THROUGH the promenade!" Kal panted, "It's quicker."

They ducked out to the deck of the many glazed ports, where normally passengers would be viewing the heavens. The place was deserted, and only swirling gray vapors showed through the thick glass.

"Too late!" groaned Ridge, "Zarko's done it; he's diving through."

Swiftly they moved toward the forward communicating door. But a sudden influx of frenzied passengers cut them off. Rete Dovis, with three squat and twisted drylanders of the red planet, were herding them in like cattle.

The mutineers were armed with flame projectors and the ugly karee knives. Kal and Ridge had only their bare fists. Resistance would avail them nothing. Suddenly Ridge knew that the thing had been planned for months; small arms were not allowed on board and could only have been smuggled in over a long period of time.

"Ho!" yelped Zarko's lieutenant when he spied them, "It is here you are! You will at once report in the navigating room, you two." Leaving his ugly cronies in charge of the passengers, he waved them forward with the stubby nose of his flame pistol.

"Filthy swine!" Kal snarled, in his own tongue.

"Easy now. We've no chance—yet." Ridge shoved his impetuous friend aside and faced Rete Dovis. "You mean we report to Zarko?" he asked.

Ridge was sparring for time. He had an eye on that flame pistol and was calculating his chances of obtaining it. But the Venerian was wary; he kept at a distance of ten feet or more, so there was no possibility of any quick footwork on the part of the athletic American.

"You know I mean that. And I go with you. Look alive!"

This Dovis was taking no chances. He urged them forward, bringing up the rear with the white flame that lurked in his weapon ready to leap forth if they turned on him.

His companions were questioning and searching the passengers. A woman's terrified scream was cut short by the sound of a brutal blow. Ridge compressed his lips and his nails dug into his closed palms. His mind refused to picture what was to be the fate of those fifty-odd passengers. Lucky there were no more.

In the navigating cabin they found things much as they had feared they would. The captain's body was a grotesque heap beneath the viewing port, a karee buried to the hilt in his broad back. Weapons of stealthy murders, these karees; silent and sure when flung by a practised hand—from behind.

Zarko stood over Tommy Reynolds, the relief pilot, who was wilting at the controls. Tommy's face was battered and bloody; his left arm dangled limp and useless. He was about to collapse. Behind Zarko was a ferret-eyed stranger, a slinky individual at sight of whom Ridge instinctively bristled. He was one of the passengers—a supporter of the mutineers!

The yellow eyes of Zarko narrowed speculatively when they rested on the captives of Rete Dovis. "You fellows ready to throw in with us?" he demanded.

Kal Turjen opened his mouth to voice his wrath, then snapped it shut. Ridge had clamped warning fingers on his arms.

"What else is there to do?" the pilot countered. His tone was careless, and he shrugged his shoulders.

Zarko eyed the Martian keenly. Then, returning his gaze to Ridge, he grinned broadly. "Good enough," he rumbled, "Ah—you'd rather *like* to make this landing on Japetus, wouldn't you now, Color?"

Ridge felt the hot blood mount to his temples. "I—I would," he was forced to admit.

"I thought so," Zarko chuckled triumphantly. Then he rattled off his orders: "You will relieve Reynolds so he can report to the doctor. And you, Turjen, will take your instruction from Mr. Dovis, the engineer."

Ridge transfixed his Martian friend with a meaning stare. He was fearful of Kal's quick temper; it would be suicide were he to resist them now. Relieved, he caught the answering gleam of the big fellow's eyes. Separated or together, they would bide their time.

CHAPTER II

The Forbidden Satellite

"WE'VE—ah—enough fuel for the landing," Zarko remarked when Ridge had taken the controls.

Kal had gone aft with Dovis, and Reynolds had staggered out on the arm of the sinister stranger, leaving a trail of blood. They had done for poor Tommy.

"*If* we can make it. It's reported as impossible, you know." A glance at the instruments told Ridge they were at thirty thousand feet and losing altitude rapidly.

"Bah! I've done it—so have others."

"What?"

The swarthy Venerian grinned at Ridge's amazement. "Fact," he gloated. "The Commerce Commission doesn't know everything. I've been here before. Friends await me even now—ah—down there. And it's perfectly safe—a water landing."

"Water!"

"Sure! listen—I'll let you in on this. You act like a pretty smart Terrestrial. Knowing what's good for you, you'll *want* to be in on it. There's no land on the surface of Japetus, only water, but a vast treasure is there, for all that. And a civilization. Things that will interest you. Won't they?"

Cold calculation was in Zarko's yellow eyes, but a hint of anxiety as well. Ridge puzzled. Why was the Venerian trusting him; why did he tell him these things? The explanation came in a flash—walking through the galley on their way forward with Dovis, they had seen a dead Martian. Undoubtedly he had been the pilot among the mutineers, posing as a mechanic. They hadn't counted on losing any of their number in the surprise attack, especially one so important. And now, with Reynolds out of the picture as well, they needed a pilot—it was imperative that Zarko win Ridge over, and he was using the bait he thought most effective. When they had landed he might change his tune.

"You bet I'm interested," Ridge enthused.

"Good enough. You'll learn more later."

The ferret-eyed passenger, who had gone out with Reynolds, slipped in stealthily. "Dead," Ridge heard him whisper in Zarko's ear.

They drew away from the control panel and engaged in low-voiced conversation that was not for the pilot's ears.

Amazed beyond measure, Ridge tried to fit together the pieces of the puzzle. He was sure now there had been no meteorite. Zarko had contrived the appearance of an accident; it was a part of his scheme. Probably he'd sent one of his henchmen through the airlock in a space suit to damage the outer plates. Perhaps even, there was not the shortage of fuel he had reported.

He had believed he could thus trick Captain Boe into landing the vessel on the forbidden satellite. That would have simplified matters, but the plan had failed and it became necessary to murder the officers and take over the vessel in advance of the expected time.

Who was this saturnine stranger in the garb of a passenger? Had he aligned himself with Zarko since the mutiny, or was he a henchman of the Venerian planted amongst the passengers at the start of the voyage? What was to become of the passengers? Surely they were of no value to Zarko as individuals—more than half were women. Ridge shuddered.

On this supposed watery surface of Japetus, what manner of inhabitants might they find? Aquatic surely—but intelligent? Despite his misgivings and his horror at the thing Zarko had done, Ridge could not but thrill to the prospect of landing and of learning these things for himself.

They had dropped to six thousand feet when Zarko sauntered back to the control panel. And the dense gray mists still eddied about them.

The Venerian laid a huge clammy paw on the pilot's bare forearm. Though his flesh squirmed at the contact, Ridge maintained his nonchalant air of expectancy.

"You'll do," said Zarko, "as long as you behave. Nothing can be promised, understand. But the treasure—a share may be yours if you serve us well. That clear?"

"Quite." Ridge untangled his long legs and straightened up with well-simulated avidity. "The treasure—"

The eyes of Zarko glittered and his barrel-like chest expanded. "Ah—the treasure. Immense! The wealth of a world is here for the taking. And there's no reason—"

But Ridge had ceased listening. Suddenly the clouds opened up beneath them and he was looking down upon a vast expanse of tossing waters. Inky black, those billows, and threatening. Heaving mightily to engulf them. The altimeter showed less than a thousand feet.

"Jupiter!" he barked, forgetting all else, "We're here."

His fingers twinkled over the control keys and there was the sharp hoarse cough of the keel rocket tubes. The vessel shivered as she was brought up short in her rapid descent. Then, with only the repelling energy of the gravity flux retarding her fall, she settled to the surface and lay pitching heavily in the pounding sea.

"Good enough," Zarko lauded.

DURING the next few minutes Ridge Coler was far too busy to give much heed to what was going on in the navigating cabin. The *Mercurianic* was no submarine, nor was she designed for surface travel in the strange element in which she had landed. But her vacuum-tight hull was of enormous strength, and the gravity energy ordinarily used when taking off from solid ground and in landing was as well capable of increasing her weight as is the water ballast employed in submarine craft. After much maneuvering, Ridge was able to submerge the vessel sufficiently to stabilize her against the battering of the huge waves and to restore an even keel. But they were lost in the trackless seas.

He turned toward Zarko, but saw that he had engaged himself with the optophone. In the disc appeared the face of Kal Turjen, his usual cigaret dangling and eyes squinting through the smoke. The Martian was grinning cheerfully as he followed Zarko's instructions in tuning the main radiophone transmitter. Kal was on the job in the radio room and was resigned to the situation.

But a more amazing sight was closer by; a girl who had come into the navigating cabin. When first Ridge saw her it was as if Zarko and the others did not exist. The sharp commands of Zarko and the optophone replies of Kal were mere unintelligible mutterings in his ears. They mattered not at all; nothing mattered but the girl.

Although attired in the snug-trousered, loose-bloused costume of a Terrestrial space traveler, she was like no girl Ridge had ever seen in any of the worlds he had visited. And she clung there, hugging the arm of the ferret-eyed one who was so closely in the confidence of Zarko. Ridge gritted his teeth savagely.

She, too, had been one of the passengers. Ridge bitterly regretted that he had not availed himself of the pilot's privilege of dining at the captain's table. He'd have met her then.

He could not tear his gaze from the vision. Although she was only slightly above medium height, hers was a figure to command instant attention. Straight, youthful, and superbly moulded, she was a perfect specimen of vigorous young womanhood, yet intensely feminine withal. Her closely cropped hair was of that indescrible hue neither light nor dark yet glinting with a dazzling golden sheen. In the creamy oval of her face was set a pair of violet eyes which—well, Ridge detested her companion the more cordially when she looked into the smirking face that was so close to her own.

"Jerry," she was saying in mellow throaty tones, "I want to be near you through all this. I insist. Remember your promise."

"Yes, Rita—I'll remember." But the man's shifty gaze was not to be held by the frankly appealing one of the girl. He was nervous and jumpy, a craven and debased schemer if ever there was one. Ridge marveled at the girl's air of possession. Surely she was not—

"Coler!" Zarko's voice broke in disagreeably on the pilot's absorption. "You will take to the air at once. Proceed in a north-easterly direction for eight hundred miles."

The disc of the optophone was blank. Kal had succeeded in making the necessary contact with Zarko's friends by radio. Coolly ignoring the girl's presence and that of the man, Jerry, the Venerian, strode to the pilot's side.

"How about the fuel?" Ridge asked him. He had thrown full power into the gravity neutralizing coils and the vessel throbbed mightily to the roar of the motors.

"Don't fret yourself over the fuel. We've plenty." Zarko's voice was sardonic; he had completely fooled Captain Boe. His gaze followed Jerry and the girl when they left the navigating cabin.

None of these things were lost on Ridge as he lightened the ship until they were riding high on the angry seas. The *Mercurianic* groaned and creaked in every plate as she was buffeted by thousands of tons of water. And then they were free of the savage fury, drifting at a few hundred feet above the highest upflung billows.

"Sneaking whelp!" rasped Zarko.

"Who?" Ridge was startled into the question by the Venerian's ferocity.

"Jerry Simonds. Meanest kind of a crook. A go-between. But there's no doing without him in this. He's the fixer."

"Fixer!" Ridge was more mystified than ever.

"Sure; he arranges with the authorities. Converts the stuff to cash, and grabs off half the loot." Zarko subsided. He had said too much already.

Here was a situation. The pot calling the kettle black. Hate and suspicion in Zarko's ranks. Double dealing, perhaps. Anything might develop under such circumstances. Honor among thieves? Ridge suppressed a chuckle.

"And the girl?" he queried, after a moment of silence.

"His sister. Rita's worth ten of Jerry, but she's in the way now. Don't know why he let her come along. It's no place for women."

Ridge cheered unaccountably at knowledge of the relationship. A crook she might be, but this altogether desirable creature was tied to the unspeakable Jerry by blood only.

WITH the inky waters beneath them and the low-lying clouds above, the *Mercurianic* hovered in the gloom. The inductor compass functioned smoothly, proving that Japetus was possessed of a magnetic field as are the planets. With short blasts from the steering rockets, Ridge swung the ship around until she headed due northeast. Then, with a mighty roaring of her stern tubes, she hurtled screaming through the twilight.

The navigating cabin became oppressively warm due to the heating of the hull plates by friction in the dense and saturated atmosphere near the surface of the water-bound satellite. It was necessary to limit the speed to six hundred miles an hour.

It was not an inviting prospect, that limitless expanse of ocean below. Nor the heavy clouds above that blotted out most of the light of the distant sun and sent down curling mist fingers to the very surface of the tumbling black waters. Ridge was depressed by the gloomy surroundings.

And when the body of Jornes Boe was borne out by two of the surly Martians Zarko had summoned, his spirits sank still further. How confidently he had promised the captain to stand by him in case of trouble; of what little use he had been to the dauntless skipper when the time came! And now he was, in effect, aligning himself with a band of thieves and murderers. In the eyes of the law, at least, he was as guilty as they.

An hour passed. Occasional radio calls, relayed by Kal Turjen through the optophone system of the vessel, provided the only breaks in the monotony and brought information on which to correct their course. Without the directional radio of Zarko's mysterious friends, they would be lost in the vastness of a world of water and rank vapors.

"Here we are!" Zarko gloated at last, "Retard speed, Coler, and make ready to land."

Land! Ridge strained his eyes in the half-light as the forward rocket tubes belched violet flame. Yes, there was land—a circle of it a mile in diameter, with a central cone that rose high to form a crater of volcanic aspect. Land, yes, but that of the ocean bed. Dry only by virtue of the enormous enclosing cofferdam that rose up from the depths to hold back the dark waters. Obviously, here was entrance to the inner world of Japetus.

Two etherships lay dimly outlined against the lighter gray of the bottom at the base of the cone. Small vessels of the scout type, but showing no topside markings, either planetary or national. Outlaws. Zarko's advance guard—awaiting him there.

The latticework of a huge cradle loomed alongside the cone, a newly constructed landing berth for a vessel of the *Mercurianic's* class. The pilot's gloomy thoughts were forgotten when he dropped the ship into the waiting space.

In the bustle of disembarking, Zarko seemed to forget the existence of his new pilot. Ridge was left to his own resources and he hurried aft to his cabin. As he had expected, Kal Turjen was there before him.

"Well?" the Martian challenged.

"Well!" Ridge shrugged, grinning broadly at his friend's owlish squint. "Looks like we're pirates now, or some sort of bandits. Have any trouble?"

"Not a bit. Dovis cottoned to me right away. Fact is, he made some rash promises. Mysterious about it, and cagey, but I overheard some of his talk with the crew. He's plotting against Zarko."

"No!" The young pilot stared. Then he guffawed softly; there was to be excitement a-plenty in the days to come. But a vision of Rita Simonds rose to sober him. "Come on, Kal," he urged. "Let's get out and have a look around."

Kal Turjen nodded solemnly, extending a hand in which a glittering object lay. It was a flame pistol. "Take this. You may need it," he whispered.

Ridge whistled incredulously. "Where'd you get it?" But the feel of the cold metal was comforting in his fingers.

"Hush! I robbed a corpse." The squinting black eyes were inscrutable, but Ridge knew that already the Martian had scored.

They made their way forward and out upon the landing stage where a scene of confusion met their eyes. In the great pit formed by the cofferdam was a horde of yelling bipeds. Averaging four feet in height, with bowed legs, their goggle eyes staring from faces of pallid green and bloated chests glistening with a metallic lustre, they were like nothing so much as the giant frogs in the swamplands of Venus. Yet these creatures were human—intelligent.

The *Mercurianic's* passengers were a huddled, frightened group down there, hemmed in by Zarko's armed guards in the midst of the clamorous rabble. Zarko himself, a dominating figure in the assemblage, was bellowing orders to his men. Far above them was the rim of the cofferdam, the great hollow cylinder of masonry which held the ocean at bay. And the roar of the restless waters was a monotonous accompaniment of rhythmic sound.

Ridge strained anxiously for a sight of Rita Simonds. But the girl was nowhere to be seen. Either she had not yet left the vessel or she was already inside the high arched doorway that opened into the volcanic cone. Where rosy light glowed from within, where——

A slight sound behind him caused Ridge to spin on his heel. He gazed directly into the crafty, sinister eyes of Jerry Simonds. In the dim light he made out a slender tube in the man's hand, a tube that was leveled at his own head. On the instant of realization, Ridge sprang forward. But the hissing black gas from the tube was quicker and the young pilot crumpled to the platform, strangling, clawing at his burning eyes. He heard the second hiss, Kal's choking gasp.

With senses reeling and eyes nearly sightless, he struggled to his knees. Kal Turjen, he saw, was down. Gasping invectives and striking out in his blindness, Ridge managed to close with Simonds. Gleefully in his semi-consciousness, he knew that the man's knees had given way under the weight flung upon him. Yelling lustily for help, Simonds was, as the pilot's fingers closed on his throat.

CHAPTER III

Cold Flame

HAZILY, Ridge came to know that insistent hands were upon him. A frantic voice was in his ear, beseeching. Then, materializing out of nothingness as his vision cleared, he saw a glorious gold-crowned head. Violet eyes, horror-wide. Mechanically, his fingers loosed their clutching hold of yielding flesh and he staggered to his feet. Quick as a flash, the girl Rita was on her knees at her brother's side, with anxious hands loosening his clothing, pillowing his head.

Zarko Nad's snarl came simultaneously with the appearance of his huge bulk on the landing stage.

"What's this?" he demanded.

Ridge could only stare foolishly. He was weak and dizzy from the gas, and his swollen tongue clove to his palate.

But Zarko's swift glances took in the situation at once and he pounced upon the slim tube of the black gas with a muttered curse.

"Jerry!" he yelped, wheeling on the dazed Simonds. "I thought we agreed——"

The girl had raised her brother to a sitting position from whence he looked up with dull, uncomprehending gaze. But it was not that which caused Zarko to break off in his tirade. A stronger man than he would have quailed before the cold, scornful fury in the beautiful face of Rita Simonds. Like a young tigress she crouched there facing them, ready to tear them asunder in defense of her own.

Zarko stepped back a pace, mumbling. Kal Turjen was recovering from the effects of the gas and was on his feet, swaying. Fumbling shakily in his pockets, searching for the inevitable cigaret. Ridge would have wanted to laugh crazily at the tableau had it not been for the potency of those violet eyes. Wondering, he looked into their fire-flecked depths; saw them slowly soften, and the long lashes drop as a surge of warm color mantled the girl's cheeks.

"Come along, you fellows," Zarko growled.

Dazed anew—and differently—Ridge stumbled along after the big Venerian down the steps from the landing stage.

The crowds of frog men had thinned out and the passengers from the *Mercurianic* were no longer in sight. Only a few of Zarko's henchmen remained outside the arched entrance to the central cone of lava.

"The swine!" Kal gulped. "Pity you didn't kill him."

"Lucky he didn't get us, you mean." All thoughts of homicide had been erased from Ridge's mind as if by magic.

They had come in through the arched doorway and were bathed in the rosy artificial light of the interior. It was a huge cavern they had entered and intense activity of the frog men centered about a central shaft of transparent material. Within the shaft was a spirally descending runway, down which the creatures were scurrying as fast as their crooked legs could carry them.

Zarko led them past this to a second, smaller shaft, where four of his crew were on guard. "Here," he grunted. "We'll go down this way. It's more comfortable."

A small car was poised in the transparent upper portion of the shaft, and they entered this with the big Venerian. With sickening speed it dropped into the depths.

Ridge could contain himself no longer. "Look here, Zarko," he blurted. "You're not taking my friend and me in tow like this for the fun of it. Why are you doing it? Simonds would like us out of the way, but you seem to prefer it otherwise. I don't get it."

The Venerian eyed him solemnly. "Coler," he said, "this is a big haul we're after here. So big that every man of this cutthroat gang of mine is itching to slip a karee between my ribs. Even Simonds. But you and Turjen are different. I—ah—I know your type. You'll fight like the devil at the drop of a hat, but you'll fight fair. And I want a couple of men like that around me."

"But, Zarko," protested Ridge, "we can't——"

The Venerian showed his white teeth. "Oh, yes, you can. I'm cutting you in on this whether you like it or not. You can't break loose. You're tarred with the same brush as the rest of us already. And you're marooned here besides. If you want to get out alive you've got to stick. After we've returned to civilization you can—ah—use your own judgment."

Kal Turjen growled. "Imps of the canals, Zarko! You take much for granted."

"Sure—why not?" The yellow eyes narrowed to mere slits. "I don't want any arguments either. This is my show, and I know what I'm doing. I'm not even asking any promises of you; I'm just telling you. If you want to be a pair of damn fools, go ahead. But if you've got the good sense I think you have, you'll stick with me."

A hot retort sprang to the Martian's lips. But the car of the lift swooped suddenly into a glare of blinding light and he stood blinking and speechless instead.

BEFORE them extended a vast chamber where hundreds—yes, thousands—of the frog men were assembling. It was a huge natural cavern, arched high overhead, and with myriads of stalactites brilliantly illuminated by reflection from a circular pool of liquid light surrounding a central dais. On the dais, in a basket-like couch of yellow metal encrusted with scintillating gems, was the strangest creature of human-like mold they had ever seen.

The body, encased in a webbing of what appeared to be metallic filaments, was shriveled and inert, a totally valueless and grotesque appendage to the enormous head that lay supported amid the cushions. A massive brain case with translucent yellow skin drawn tight over all. Hairless, and with features that consisted primarily of two great unblinking eyes. Once those eyes were observed, the rest was forgotten. The creature was all brain, and awful, all-seeing eyes.

"Bzor!" Zarko whispered. "The brain!"

The lift had brought them to a small balcony adjoining the runway down which the frog men were trooping from above. They joined the throng and moved swiftly down to the rim of the pool of light.

Blinded by the intense cold whiteness of the pool's radiation, Ridge peered through a luminous haze and saw only the saucer orbs of Bzor. Staring fixedly, looking into his very soul.

"Jupiter!" he gasped. "It's the Old Boy himself!"

Kal Turjen was silent, agape.

And then a thin, piping voice came out of the luminous mist. A voice that shrilled precise syllables in the ancient tongue of Yrldrun, the floating continent of Saturn.

"Well done, oh Zarko," it chirped. "As quickly as you instruct my engineers in the operation of the great ship of the heavens will the jewels be delivered."

Swift understanding came to Ridge Coler. Zarko had bargained for the treasure with this monster called Bzor. For a fortune in jewels he was delivering the *Mercurianic* into the hands of the frog men. For this he had done murder and worse. But why did these creatures of the water-bound world want a huge space liner? How——?

Zarko was replying in solemn booming speech, and the eyes looked out from the light-haze with expressionless intensity. They seemed detached and apart from all things resembling humanlike in the known universe, those satanic orbs. Cold and unfeeling, yet possessed of uncanny intelligence and understanding.

"Good enough, oh Bzor," the Venerian was saying, "Even as the pact was sealed, so shall it be. After one period of sleep we will be prepared to conclude the bargain." Zarko's words were carefully spoken in the unaccustomed tongue of Yrldrun.

"It is well," the thin voice gloated.

All was silence in the great cavern save for the soft rustle and murmur that arose from the restless movements of thousands of frog folk. Ridge saw that Zarko was ill at ease; Kal Turjen was struck dumb with amazement. Not fifty feet away, Rita Simonds stood at the edge of the pool of light, eyes bright with wonder, her beauty ethereal in the dazzling illumination. At her side was the nefarious Jerry.

The unblinking eyes of Bzor shifted to the awed group of men and women who were the unfortunate passengers of the *Mercurianic.*

"Who are these under guard of your men?" the piping voice inquired.

"Prisoners from the inner planets, oh Bzor," boomed Zarko, "You may do with them as you will."

Ridge stiffened. Was the Venerian callously sending these people to their death? Many were his own countrymen.

"It is well," came from out the circle of light. And it seemed there was evil satisfaction in the yawping voice of Bzor.

Instantly a chorus of gulping yells came up from the throats of the frog folk. An ominous sound that swelled rapidly to deafening intensity, then trailed off on a vibrant, gleeful note. Rhythmically it rose and fell. A chant of death.

A shrill gurgling came up from the depths of the pool and weaving fingers of cold light reached forth. Terrified shrieks from the group of passengers were drowned out by the quickening swells of the chanting. And, shading his eyes with his hand, Ridge saw that Rete Dovis and his guards were forcing the panicky prisoners across the rim of the light pool into the mists that enveloped Bzor.

An aged Terrestrial flung high his palsied hands and was sucked down into bubbling, shimmering depths by the light-finger which had curled about him. Screaming hysterically, a young woman fought her way from the edge of the pool and thrust her infant child into the arms of a guard. Ridge saw the swarthy drylander grin as he swung the tiny body aloft and whirled it over the heads of the frenzied prisoners. A moan of anguish came up from the pilot's throat as the child was hurled shrieking into the greedy maw of the dancing light-mists.

"Imps of the canals!" Kal Turjen could stand no more. With a bellow of fury, he drove across the intervening space toward the murderous drylander of his own planet.

The spurt of flame from his pistol was a dim yellow flare in the blinding whiteness of the pool of Bzor, but Ridge saw the guard wilt and shrivel to a cindery corpse in its blast. Then Kal was a raging demon in the midst of the outer ring of mutineers.

Yelling encouragement, Ridge dived after him. But his arms were pinioned from behind and he was brought crashing to the pavement by the huge weight flung upon him. The voice of Zarko was in his ears—

"Lay off, you fool! This Bzor has powers you can't resist."

But Ridge twisted under the great weight of the Venerian and brought up his knees sharply. Zarko grunted with pain and the grip of his massive arms relaxed. Quick as a flash, the young pilot was on his feet. Shouting hoarsely. Stumbling as he ran.

It was a nightmare of fantastic, impossible happenings. In the midst of the cold light haze of the pool were only the eyes of Bzor. Malevolent now, and watchful. Screeching and fighting against the streamers that reached forth and drew them into the bubbling liquid luminescence, the prisoners were enveloped swiftly. And Kal Turjen was a battling madman beset by no less than a dozen of the guards.

Ridge flung himself into the tangle. Flame projectors useless in a hand-to-hand fight, it was a battle of brawn and of karees. A grinning face was there before him, and the pilot battered it down with flying fists. A smashed and bloody thing.

"Kal!" he yelled.

The Martian saw him and lunged joyously forward. Together, they would take terrible toll of this rabble before the inevitable end came. A karee swung high and Kal plunged in under the arm that raised it. Ridge saw the swift upthrust of his friend's bronze shoulder, heard the snap of his assailant's neck. The knife went spinning harmlessly off into the mists of light.

Off guard for an instant, Ridge staggered under the impact of a heavy body that drove into him head foremost. He brought up a short arm jab and the head came up with a snap. It was Rete Dovis. His karee flashed and blood spurted as the pilot caught the thrust on his forearm. The pain of it Ridge felt not at all as he grappled with the big Venerian.

Knowing he was no match in brute strength for his bulky adversary, Ridge fell back sidewise and relaxed his muscles. Dovis yelled in triumph, but it was his last yell. In his apparent yielding, the young pilot had his assailant off balance. A swift gripping of the Venerian's thick wrist and the knife was turned. The sudden tensing of a leg was placed where the leverage of Dovis' own great weight was most effective. The triumphant cry of Zarko merged into a wheezing sigh as he plunged forward heavily. Impaled on his own karee, he lay there squirming, dying.

BUT a sudden paralyzing weakness overcame Ridge and he fell to his knees. He was enveloped in frigid whiteness for an awful instant. Numb with cold. Blinded. Then his vision cleared and he saw that hostilities had ceased. The guards had fallen back, and where the pool of light had been was a roaring pillar of cold white flame that extended upward to the highest reaches of the cavern arch.

He saw bodies whirling within the dazzling whiteness, carried up with the blast. Rigid, icy bodies borne aloft by the freezing horror. The passengers, all of them, had vanished. And Kal. He, too, was swallowed up in this incomprehensible pillar of cold light. Gone!

Painfully Ridge crawled toward the foremost of the chanting frog men. He wasn't at all clear in mind as to his reason for doing this. But he must get out of the circle of chill radiation. A fierce hatred of Bzor and of Zarko welled up within him.

And then, with a thunderous detonation, the light pillar vanished in suddenly darkened and yawning immensities of space overhead. In the huge cavern was only a faint rosy illumination—ghastly silence.

"Get up!" The voice of Zarko was in his ear, strangely awed and vaguely concerned with his welfare. "Get up, Coler, you're safe now."

Swift warmth flowed into his being to replace the cold. Sudden renewal of full vigor came to his body, and Ridge leaped to his feet, growling savagely.

"Damn you, Zarko!" he yelled, "This is your work. You rotten murderer of innocent people!"

Hardly knowing what he did, he whipped out the flame projector and swung it in an arc that included Zarko and the entire pirate crew. The throng of frog folk, he saw, now stood rigidly erect with bulging eyes raised aloft. Worshipping! This Bzor was their Deity. The pool of light, and the dais, and the malevolent God of Japetus had vanished.

Startled by the Earthman's ferocity, Zarko stood swaying uncertainly. Jerry Simonds, Ridge saw, had stepped out of the shadows and a flame pistol glinted in his hand. But the girl Rita flung herself upon her brother and bore him back.

"Take it easy, old man," Zarko was saying, "Bzor will—"

"Yes, Bzor!" Ridge shouted, "Where is the devil?" Madness was upon the pilot as his eyes searched the roseate dimness for the monster.

A sickly grin contorted Zarko's features. His lips moved, but no words came forth.

Then, with crashing abruptness, a stabbing pencil of white came from out the dark arches and smote Ridge Coler with mighty force. His blood congealed in his veins. Numbing, bitter cold pierced him through and through. His eyes saw only gelid emptiness. Crystal whiteness swept down over him and he knew no more.

CHAPTER IV

Spawn of Past Ages

CONSCIOUSNESS returned swiftly and painlessly. And memory came with devastating force ere Ridge had opened his eyes. He groaned.

Immediately a chorus of soft chirpings fell on his ears and he drew himself up with a jerk, every sense keenly alert on the instant. He had lain prone on a crystal slab and now sat on its edge, blinking amazedly at his surroundings.

The lidless optics of Bzor regarded him solemnly from close at hand. And fully a score of these creatures of the big heads and shriveled bodies were grouped about him. Each was cradled in his own cushioned basket-like couch, and each bent questioning saucer-eyes on the Earthman.

"Jupiter!" Ridge marveled, "I'm dreaming."

"Not dreaming," piped Bzor, "nor yet in the land of the dead. You find yourself before the council of New Yrldrun, on trial."

There was utter lack of expression in the monster's bland face, if face it might be called. The thin bloodless lips hung loosely parted. Even the great eyes seemed to lack lustre. Only the rhythmic throb of huge purple veins under the parchment-like scalp gave evidence of life.

Ridge's hand strayed to his pocket and his fingers closed on the flame pistol. They had not disarmed him.

"On trial!" he repeated blankly.

"Even so." There was no perceptible movement of Bzor's lips as he shrilled the words. But a cold gleam came into his unmoving eyes.

Swift flame darted from Ridge's weapon as he slipped catlike to his feet. With equal swiftness, the weblike filaments surrounding Bzor's inert body glowed emerald green. And the flame swept violently upward, expending its fearful energy harmlessly on the crystal ceiling.

By not so much as a flicker did the circle of staring eyes betray surprise or anger. Nor did Bzor himself display the faintest sign of emotion. Ridge clubbed his pistol and lurched forward. But the green glow came instantly. His fingers stiffened and spread wide under the strange power of the radiated energy. The weapon fell clattering to the floor.

"You win!" he snarled, and subsided.

These creatures of the massive brains and helpless bodies were invulnerable. Invincible.

"Be seated." Still the lips of Bzor scarcely moved, and still the expressionless orbs were upon him.

Ridge sat on the crystal slab and drew his knees up to his chin, wrapping his arms about them. With a start, he saw the long gash, furrowed by the karee of Rete Dovis, had completely healed. More of the science of these creatures. But, why should they waste their healing art on him? Ridge puzzled anew.

"What are you called by your fellows?" Bzor asked.

The pilot told him in surly tones.

"And your friend of the coppery skin?"

Ridge choked back a lump that rose in his throat. "Kal Turjen. What of that one—of him?" He was experiencing some difficulty with the unaccustomed language of his questioner.

"He will recover."

"Recover! He lives?" Untangling his long limbs with sudden vigor, Ridge sprang to his feet.

"He does, oh man called Reej."

The young pilot could hardly credit his senses. He had been sure that Kal was no longer in the land of the living. But now . . .

"Tell me," he demanded, "What does all this mean? Why have you brought us here?"

"Behold!" At the curt reply of Bzor, there was a dimming of the rosy illumination and a ten-foot circle in one of the crystal walls went utterly and awesomely dark.

IT was no ordinary darkness, this sharply outlined circle of obscurity, but a complete obliteration of light. Utter absence of wave motion of any sort. The annihilation of space, time, and matter. It was as if Ridge looked through and into a vast cosmic void.

And then, as his eyes accustomed themselves to the strange blackness, misty shapes took form in the area. Brilliant light points came to stud the velvet blackness. A great heavenly body rushed out of the ebon vastness. A familiar body, with bright encircling rings—Saturn. With mad speed, they appeared to be hurtling toward it. Ridge gripped the edge of the slab on which he sat as the eerie sensation persisted.

The voice of Bzor seemed to reach him from some immeasurable distance as he spoke swiftly in explanation:

"What you observe, oh Reej, are light images akin to those of your own optophones. Here, however, you are looking not only through space itself but into the past as well. We do this by capturing wave motion equivalents of light and sound long since released but still adrift in the immensity of the etheric cosmic. Hundreds of generations into the past we see and hear—now."

On his last word there was a swift blurring of the view as when a crashing space ship meets its doom. The surface of Saturn flung violently upward. When it seemed that collision was imminently certain, there came an abrupt change. The view stabilized. Stationary and moving objects were clearly revealed. It was as if Ridge Coler had been miraculously transported into the ancient land of Yrldrun.

It was but the beginning of the fantastic history of Bzor and his kind. And, spellbound, the young pilot sat as the strange tale was unfolded to his eyes and ears.

In the dim and distant past of Yrldrun, Bzor and a group of his associates discovered the secret of immortality. Eternal life was theirs, eternal youth. But alas, it was only of the mind and not of the body. Those imperishable brains lived on and acquired incalculable knowledge. But the bodies withered with age. Limbs palsied. Normal functions of the body ceased. Within the span of their own generation those experimenters came to be outcasts. The life they could not lose save by violence became a burden. Bitter; impossible. Many of them contrived their own destruction by mechanical means. But Bzor and a few of his closest friends lived on, searching perpetually for a means of restoring youthful vigor to their aging bodies.

Conditions in Yrldrun became intolerable and they decided to set forth to a new world where they might start afresh, where, with their scientific attainment and unlimited mental capacity, they might work unhampered toward the end they so greatly desired. Their own kin had cast them off and sequestered them on a tiny island where opportunity was scant. They would go to a new land—at once.

A huge cannon was constructed on their island. A great projectile was fitted up with oxygen apparatus and hermetically sealed against the vacuum of outer space. Vast charges of explosives were placed in the bore of the enormous piece of ordnance. And they shot themselves off into space.

The satellite, Japetus, which they called Reylis, was their objective. It seemed, from the astronomical knowledge they then possessed, as best suited to their purpose. If it proved not to their liking after they had landed, they would construct another great cannon and proceed elsewhere. All eternity was at their disposal.

Their projectile landed unharmed on the surface of a great body of water. Bzor's party was rescued by a school of semi-intelligent aquatic mammals and brought to land. These were the progenitors of the frog men, their evolution much less advanced than at present. But they were friendly to the newcomers, and ministered to their wants and needs. In later ages, their descendants came to worship Bzor and his kind of gods.

The adventurers soon learned that the volcanic island to which they had been carried was the last remaining land of the satellite. It, too, was soon to be engulfed by the ocean. They decided to leave Reylis. But, again, fate was against them. A generation of frog men worked out their lives in mining operations but could locate no metallic ores other than gold and silver. There was no iron in all Reylis, no metal of sufficient strength and hardness for the building of a cannon from which to fire their projectile. They must remain.

But they did not remain idle. In anticipation of the rising of the waters they used the energies of another generation of frog men in constructing the great dam surrounding the entrance to the caverns beneath. At least they would provide themselves with a refuge.

Down through the ages their bodies became of less and less use to them. But the massive brains worked on. The frog men provided their hands and their means of locomotion. And they progressed enormously in electronic science, hampered only by the lack of certain elements. In these hungry, immortal brains was ever the hope that physical vigor might be returned to their atrophied bodies. Or—that new bodies might be supplied. And the latter idea became an obsession.

They experimented with raw protoplasm and with chemical and electrical excitation. In time they developed artificial means of reproducing their own kind. Their number increased to more than a thousand. And still the great brain cases were helpless, immovable things with rudimentary and paralyzed bodies.

Through their control of electronic forces, they were enabled to perform marvelous feats of surgery. The frog men offered themselves as subjects of experiments. A number of them gave their ugly bodies, and actual substitutions of Yrld heads for their own were accomplished. But the frog men were creatures of cold blood, and the hybrid products of these head-graftings came to be idiots. Only the bodily characteristics of warm-blooded animals were suitable to the needs of these remarkable brains. Only humans could be used.

Then came the first vessel from outer space to be wrecked in the heaving waters of the satellite. One of those vessels before the days of Vorn Jare, Ridge thought grimly. One reported as lost. And it was indeed lost. So were its occupants, for the frog men caught them and carried them to Bzor. Decapitated, the warm, still living bodies were grafted to two monstrous Ylrd heads. Successfully. The two hybrids would still be alive had they not, in their exuberance, attempted to wrest away the power of Bzor. It had been necessary to destroy them with the electronic energies of the cold light.

Ridge had seen and heard quite enough. "Stop it!" he roared, "Stop it, you devils!"

THE time-space television went blank and the crystal-walled room once more flooded with rosy light. Bzor and his council were a ghastly circle of motionless, expressionless monstrosities. All evil, coldly scientific brain and calculating eyes. No semblance of human compassion was in them.

Ridge was trembling with horror and rage. And afraid. No man living would have been unafraid in the face of the awful thought that filled his mind. Death only is not so terrifying, but to think of one's body living on as an unwilling accessory to the evil deeds that must result from the unholy alliance with one of those vicious minds was appalling.

"Your intention," he quavered, "is to do the same with my friend and me? With those others—the passengers of our vessel?"

"Be not so hasty, oh Reej," piped Bzor, "Only a few are chosen for the honor of providing us with bodies. And you and your friend are not among these, since your blood counts are not suitable."

"What then?" Emboldened though he was by the knowledge, Ridge quailed inwardly at realization that the test had been made.

"You and this man Kaal are to assist us in the work that is to come."

"Oh." The pilot grinned with swift elation. So that was it. Their services were in demand. First Zarko, now Bzor. As long as there was life there was hope.

"Even so. We have bargained with this Zarko for the large ethership in order that our plans may be carried out most expediently. He will leave with his smaller vessels when the treasure is delivered and we shall make good use of the commodious one."

Ridge frowned perplexidly. "Wait a minute," he objected, "Do I understand you'll keep this bargain with Zarko?"

"Bzor never has broken his word. When this pirate of space first reached us with his tiny ships was the bargain made, and it shall be kept to the letter. We needed a much larger vessel, since we must obtain many humans from the inner planets for our experiments. With our energies of the cold light will we capture them, and, in the course of time, we shall be provided with a sufficient number of strong young bodies."

Ridge stared with growing horror. "And I?"

"You are to aid us in operating the vessel during the raids of Earth and Mars. We do not fancy the ponderous and slow-moving bulk of the Venerians, so will confine ourselves to those two planets."

The young pilot pondered this in gloomy silence. A way might yet be found, but they'd have to move with extreme caution, he and Kal. It was more than their own escape . . . they must contrive between them to make this horrible thing impossible. . . .

Suddenly he thought of Rita Simonds, and an awful fear gripped him. What if these monsters repented of the immunity they had granted to all of Zarko's crew? Kal and himself they had singled out as enemies of Zarko on account of the fighting . . . If Jerry Simonds started anything, they might well do the same with him . . . and with the girl.

A thin voice called out in muffled tones, seemingly from the crystal wall at his back. Startled, Ridge whirled on his heel.

As frost melts away under the rays of the morning sun, the wall of crystal dissolved into nothingness. And one of the basket containers, with its inert Yrld freight, drifted into the room, supported a few feet from the floor by a rolling ball of emerald green energies which were fed from the glowing web surrounding the thing's withered body.

A swift interchange of words between the newcomer and Bzor. So swift that Ridge was unable to catch the meaning.

But he gathered that something of moment had occurred, or was about to occur.

Bzor raised his own gem-crusted basket with the green repulsion rays and snapped forth his orders. The crystal room was cleared of the other occupants as if by magic. And then Kal Turjen, unscathed but with solemn mien, strode forward from the shadows beyond the wall that had vanished.

"Ridge!" he exclaimed, his black eyes lighting.

"Kal!"

They gripped hands—mightily.

"We go to the vaults," Bzor was saying, "Come."

But the two men gave him no heed in the moment of reunion.

"Come."

This time the voice was crisply insistent. But more insistent still was the flashing green energy that accompanied the command.

Rigid in every joint, the two men walked forward stiffly after the fashion of automatons.

Robots, they became, utterly subservient to the will of Bzor as imposed through the medium of the green rays.

Marching to whatever awaited at the end of the dim passage into which their unwilling feet carried them, completely at the mercy of the green energy.

CHAPTER V

Revolt

THEY came out into one of the rose-lit caverns where many of the frog men and a number of basket-cradled Yrlds were assembled. The radiation of Bzor's green energy subsided. Once more the Earthman and his Martian friend were able to control their own movements.

"Got a cigaret?" Kal whispered in English, "I'm out."

Ridge grinned as he produced his own case. "That your biggest worry?" he chuckled.

"It's a help to have 'em." Kal Turjen inhaled luxuriously and his squinting gaze sobered. "They give you the dope, Ridge?"

"I guess so. You mean the—the surgery?"

"Yes. Imps of the canals!—I saw them." Kal shuddered. "The passengers . . . all carved up."

"All!" Ridge's exclamation was horror-filled.

"Every last one. They have to try about ten before they find one that suits."

"Jupiter!" The young pilot conjured up a swift mental picture of the ten thousand victims there would be if Bzor . . .

A sudden tingling in his joints warned Ridge of the watchfulness of Bzor. He turned to look into the evil eyes.

"They come," the thin lips chirped. "You will remain by my side during the consummation of the bargain. After that we proceed to the large ethership."

Ridge raised his eyes to the squinting black ones of his friend. They were almost closed in the curling smoke wisp from his cigaret—expressionless as those of their captor. Kal, too, was thinking that the time was close at hand. Minds groping for a possible solution of their difficulties, they regarded one another solemnly.

A twittering murmur came up from the frog men as Zarko and his motley crew straggled in. The big Venerian walked slowly forward and halted before the jeweled basket of Bzor.

He avoided Ridge's eyes studiously. And mortal fear was in the wavering gaze he cast on the master mind of the water-bound world.

"You have not examined the big vessel, oh Bzor," he offered.

"I have not. But my frog men have attended to the matter of refueling. And I will not now require your offices in the way of giving instruction to my engineers as to the operation of the internal mechanisms, since these two at my side have volunteered their services."

"I—I see," Zarko faltered, "But the bargain stands?"

"It does, most certainly."

Bzor raised his cracked voice in the queer gutturals of the frog men and there was instant activity among them.

Ridge Coler growled in his throat, then cursed Zarko softly in his own tongue. The Venerian had done this. How else had Bzor known of his and Kal's abilities?

The frog men were carrying heavy chests from crypts in the wall of the cavern. Huge boxes of hammered silver with hinges and bands of gold. Corroded and slime-covered from the dampness of ages. Five of these were set before their master and the bearers threw back the lids and withdrew to the ranks of their fellows.

Ridge gasped when he saw the contents of the nearest chests. The ransom of empires was here; the wealth of a dozen worlds! Cut and uncut gems of fabulous values when measured by the standards of the inner planets. Glittering rubies and huge emeralds. Black diamonds and diamonds of the purest blue-white. And crude ornaments of rusty unlovely iron. Iron. Iron!

Zarko and his men crowded close, clustering around the chests. Shoving and jostling one another as greedy hands reached forth. Eyes glittering with cupidity.

Bzor's voice cut in sharply. "The bargain, oh Zarko, was to the extent of all that might be carried on the persons of yourself and two of your trusted lieutenants."

Here in the bowels of the water-bound world these riches were of no account. But, later, when the evil minds of the Yrlds had been provided with healthy human bodies, other worlds would be opened to them. With this wealth they might purchase allegiance. Effect the overthrow of civilizations. They had planned carefully through the ages.

Then Ridge saw Rita Simonds and his heart stopped beating for a breath-taking moment. She was pressing forward with her brother and her great violet eyes looked out at Ridge with piteous appeal. There was no mistaking the directness of her gaze. The frank avowal of desperate need—and of trust in the man to whom she was appealing.

The young pilot looked around at Bzor; saw the faint green glow of his webbed body covering. The warning tingle of the radiant energy stabbed at his joints.

Zarko and Jerry Simonds were on their knees at the chests, with one of the husky drylanders assisting them. Ridge saw the Venerian lay hands on a huge diamond and thrust it into his leather bag. Two thousand carats, at least. In itself, an enormous fortune.

Simonds was snarling in Zarko's ear. Ridge caught swift ugly words of Sol-ido. "Fool! Only listen to me and we'll grab it all. It's easy, I tell you."

"Shut up!" Zarko hissed in reply, "We're lucky as it is. We—"

The rest of it was lost in the soft pleading of another voice that was very near. Rita Simonds. There at his side! Ridge went cold with fear for her. But a glance at Bzor assured him that the interest of his captor was engrossed in the bickering avarice displayed there at the chests. Lucky Bzor had not learned Sol-ido.

"You must help me, Ridge Coler," the soft voice was begging, "My brother—he's all I have. I must save him from himself. Don't you see? He's out of his element with these pirates, crazy with greed. He'll get himself killed if he persists. Or life imprisonment if he does get away and home. Oh, I just can't—"

Her voice broke on a sob.

Just like a woman, Ridge thought grimly. No thought of her own desperate straits; only of that scapegrace brother of hers.

"Easy now, Miss Rita," he whispered, "We're all in a bad box, but if there's the slightest chance I'll do it. Get back there with the others—please."

Her eyes and the pressure of the soft warm hand rewarded him.

Kal Turjen looked over and dropped a meaning eyelid. Ridge felt the hot blood mount to his temples. Devils take the Martian!—he'd have his chaffing in the very jaws of death.

Jerry Simonds drew himself suddenly erect, flinging his heavily loaded pack into the waiting arms of two terrestrials of the crew who had come up behind him.

"Ready, men!" he shouted.

And instant darkness came in the wake of a muffled explosion high overhead. The wily Jerry had tossed aloft an air-screen bomb, one of those atom-disrupting missiles that block off a layer of air into an utterly opaque screen. In the resulting blackness there was wild pandemonium.

Rita Simond's despairing cry rang out. "Jerry! Ridge!"

The young pilot sucked in his breath sharply. That final call for his support struck deep into his soul.

"With you, old timer!" Kal's hot breath was on his cheek.

A flame projector spat fire and a frog man was a glowing torch in the blackness. For a brief instant only was the scene lighted, but in that instant Ridge Coler glimpsed a gold-crowned head—flung back; eyes staring. And the slim body of Rita Simonds bent double in the clutching arms of a squat drylander.

The gulping shouts of the frog men made the darkness hideous. But there was no sound from Bzor and the rest of his weird tribe.

Ridge plunged into the blackness in the general direction of that flash he had had of Rita. Bellowing, reckless of consequences, Kal was beside him, clinging desperately to his shoulder. Momentarily, he anticipated the gripping energy of the green rays.

Bzor had other plans for the immediate future.

A second stabbing flame lighted the gloom. Ridge drove a hard fist into a drylander's face. He felt the crunching of bones under his knuckles. Swiftly exploring fingers located the fellow's flame projector. Once more Ridge was armed. But he had not reached Rita.

And then a dazzling pillar of cold light rose suddenly, snuffing out with a violent concussion as it contacted with the air-screen above. With it vanished Bzor and the other creatures of the baskets. And the shouts of the frog men merged into a wailing chant.

The screen was losing its effectiveness. Dimly the rosy light shone through. And, in the dimness, shadowy figures were struggling—Zarko and Jerry Simonds, tearing at each other's throats. Much as he loathed Simonds, Ridge flung himself on the Venerian. It was Rita's wish. He'd do what he could. But Zarko's head rolled weakly on his shoulder as the pilot closed with him. The hilt of a karee projected from his breast, and Simonds slipped out from under the slumping body.

"Coler!" the Venerian gasped, "He's got me. Listen—it's iron that protects—steel—"

And with those cryptic words Zarko Nad gasped his last.

THE frog men were streaming out into a side passage when Jerry Simonds flung aloft the second bomb. Before utter darkness swept down once more, Ridge hurled himself at the drylander who was holding the girl. Valiantly, she was pounding the brute's face with her fists. With the fury of a tigress she struggled—in vain.

"Here, I'll take her," Ridge grunted, in the tongue of the Martian drylands.

"Who're you?" the fellow panted. He was having his troubles with his charge.

"Vanos."

Vanos had been the one who went down under the pilot's first charge, whose flame pistol he now clung to so tenaciously.

"All right. But don't let her bother the boss."

The boss! Obviously Simonds had won them all over from Zarko's leadership.

Ridge pressed his lips to the girl's hair. "It's Ridge Coler," he whispered, "Lean on me, now—there."

Weakly she slumped into his arms. "Jerry," she moaned.

"He's all right," Ridge answered gruffly, "Zarko's dead."

"Oh,"—a sigh of relief.

The young pilot fought down the sense of elation that came to him with the holding of that precious body so close to his own. It would not do to give way to his emotions now. He moved steadily toward one of the passages he had located in his mind during the brief interval of half-light.

The bedlam in the cavern was subsiding as the frog men fled the scene, and the barked orders of Jerry Simonds came to their ears. The pirate crew was engaged in transferring the entire contents of the chests to their bags.

"Here's the passage," Kal's voice spoke from out of the darkness.

Ridge had known he was there, though he had given no indication of his presence for several minutes.

The girl was on her feet by the time they came out into the dim rose glow of the passageway. She looked fearfully up into the grim face of the pilot.

"You're sure about Zarko?" she asked.

"Positive. He died at my feet." Evidently the girl's only fear for her brother's life had originated in the bad feeling between himself and the Venerian. And Ridge was not one to rouse new fears by speaking of the menace of Bzor.

The passage turned abruptly and they came out into a chamber whose walls and roof were of clear transparent crystal. The ocean was all around them, lighted to a shimmering green by phosphorescence of a great cliff wall that towered beside the crystal tube.

"See there," Kal exclaimed, pointing, "The frog men are leaving the interior."

It was true. The hinged door of an airlock in the wall of the cliff was open and great numbers of the frog folk were swimming out into the green-lit depths.

"Wonder what that means," Ridge muttered. He was thinking of the reason Bzor might have for getting them temporarily out of the way.

"Why," the girl at his side enthused, "They're amphibians. They live as well under water as in air. Harmless creatures, too—rather likable."

"True." The young pilot looked down into the shining violet eyes and his conscience smote him. There was little likelihood that any of them would come out of this place alive. And the thought of her fresh loveliness snuffed out of existence. . . .

"Ridge! The main cavern." Kal's exclamation broke in on his thoughts.

They came through the crystal blue tube up on a railed balcony that led through a forest of stalactites. And below them was the rose-lit floor of the great cavern in which they had first seen Bzor. It was deserted of life. And, somehow, there was definite menace in the very fact of its emptiness.

The feeling communicated itself to the girl. "Ridge," she said nervously, "Do you think he'll come through safely? Jerry, I mean."

Impatiently Ridge answered her, and could have bitten off his tongue when the words had left his mouth. "He's done pretty well for himself so far."

"Oh!" The violet eyes were tragic—wounded.

"I mean,"—hastily, "He seems to have things very well thought out and—oh—is pretty well able to take care of himself. I—if I were you—I wouldn't worry too much about him. Now, at least. It's time you did some worrying about yourself—I mean—"

He was floundering deeper and deeper when a flash of cold white light struck down from amongst the stalactites. It came almost as a welcome interruption.

Bzor had struck his first blow in retaliation.

Two of Jerry Simonds' men staggered out from one of the lower passages carrying heavy packs on their shoulders. The light shaft bathed them in cold weaving luminescence for an instant and was gone, snapping up into the vaulted reaches with a thunderous roar. And with it vanished the two bearers of the treasure.

No wonder Bzor had cleared the caverns. It was to be a war of extermination against the faithless bargainers—from his laboratory overhead. And all must pass this way to reach the outside.

Rita Simonds swayed on her feet, a moan of comprehension escaping her whitened lips. Ridge Coler caught her in gentle arms as she fell.

The strain of the long battle in behalf of her worthless brother had been too much. . . .

CHAPTER VI

Destruction

WITH the unconscious girl draped over his right arm and the flame projector clutched tightly in his free left hand, Ridge searched the maze of icicle-like formation overhead. He knew that Bzor's laboratory was up there—where the cold light originated. But there was no opening to be seen, nor was there a sound to indicate the presence of any living being within earshot.

"Must be the energy strikes down through the solid rock," Kal grunted.

"Um-yes. But you can bet they see what's going on down below."

"Think they see us?"

"Why not? They're saving us for their dirty work, that's all. And maybe we'll fool 'em."

"Huh!" Kal's snort was dubious.

But Ridge Coler had an inspiration. "Jerry—Jerry Simonds!" he called out. His voice echoed hollowly in the huge cavern.

Rita Simonds stirred in his arm and he tightened it convulsively about the slender waist.

"Listening, Coler," came the cautious reply in Sol-ido.

"Got any more of those air-screen bombs?" Ridge held his breath in expectation of a blast of energy from above.

There was no reply to this, and the young pilot's spirits sank. Bzor's energies must have gotten to Jerry somehow in the side passage in which he was hiding.

But no—he saw the swift arc of a pellet flung high from a low arch in the far wall of the cavern. Simultaneously there came the swift stabbing shaft of white from above. But no figure was there in the arch when it splashed its dazzling spray of freezing death. And the black opacity cut across the cavern as the cold flame receded with its characteristic detonation.

There were triumphant shoutings then under the screen and frantic blasts of the cold light from above, striking through, but blindly. The din of the repeated concussions was terrific.

"Come on, Kal!" Ridge, with his precious burden, sprinted for the transparent lift-shaft at the end of their gallery. It led down to the main floor of the cavern.

Though they were above the opaque screen, they went unmolested. Ridge had counted on this. Bzor and his companions were too busily engaged in their efforts to pierce the screen and destroy the outlaws to pay them any heed up here. They reached the lift safely and flung themselves into the car.

Before they shot down into the darkness, Ridge stole a look at the girl in his arms. Long, dewy lashes fluttered on the pale cheeks. She'd be out of it in a moment. Impulsively, he pressed his lips to those softer ones so provocatively near.

And then they were slipping through the blackness of midnight. The fragrant lips responded to his pressure. Soft arms crept up around his neck. They clung together there in the darkness, these two, oblivious of all else. Were the universe to crash about them in the next instant, they would still have had this mad moment of ecstasy. Resistless, the force which had drawn them together, even had they wished to resist

The lift halted and they stumbled out into the flame-shot darkness of the cavern. When the cold light stabbed through it was with but a fraction of its usual brilliance. But Ridge saw a group of running men lapped up and vanish in its maw as it splashed amongst them. The hit-and-miss methods of Bzor were productive of some results at least.

"I'm all right now," Rita panted.

Ridge loosed his encircling arm, but she clung fast to his hand. At the next light flash they directed their steps toward the shaft of the main lift that led to the outer air. Kal Turjen ran on ahead of Ridge and the girl.

"Jerry!" Rita Simonds called out excitedly.

It was utterly and awesomely dark once more. "Where?" Ridge asked her.

"Over there—at the lift. I saw him!"

In another moment they, too, would reach the spot. But all could not enter that tiny car.

Another flash of the cold light splashed almost at their feet and Ridge frantically drew the girl back from the frosty blast. By its light they saw Jerry and a half dozen of his men fighting to get inside the car.

"Jerry!" the girl called again in the sudden dark that followed the flash.

Ridge maintained a grim silence. Little Jerry Simonds cared that this self-sacrificing sister of his was in danger!

There was another flash, a fainter one, over at the lift. For a vivid instant a human torch glowed. Jerry had shot down one of his men, a Terrestrial, who was crowding him at the door of the lift. Rita moaned.

"The lift's dead!" Jerry was shouting then, "They've cut off the power. Take to the spiral runway, men."

The screen of darkness was lightening and a second bomb burst in the air above. Blankness once more, thick and stifling. The flares of cold light were scarcely visible as they shot through the screen, but the thunder of their recall was deafening.

Gasping, stumbling men were all about them. Ridge drew the girl close as he pushed toward the runway shaft. He'd never let her go now.

"Kal!" he called out.

There was no reply, but, in the next weak flash of light, Ridge saw that the Martian had fallen back and was keeping close to Jerry Simonds. Suspicious of him, Kal was, and he wanted to be on hand in case of a treacherous move.

Ridge was in the lead, with the girl, when they came up into the rosy light of the runway shaft. The thundering in the cavern ceased. Utter silence reigned, save for the panting of the men who struggled behind them under their heavy loads of loot.

AT the outer arch they halted and the others caught up with them. With maniacal, bloodshot eyes, Jerry Simonds surveyed his sister and the young pilot. It was as if he did not know them—not even the girl.

"Jerry," she pleaded, "You'll not—"

"Don't bother me," he growled, "I've got the stuff now—all of it—and I'll get through with it. It's mine, you hear, mine."

His voice rose on the last words and foam was at his lips. Jerry Simonds was stark staring mad.

"I'd drop it," Ridge said mildly, "You'll never make it with that load." He was thinking of the reception that must await them outside.

"Think I'm crazy, do you?" Jerry Simonds cackled, "No, I tell you I'm getting through with it. Right now!"

Lunging wildly under his burden he lurched through into the great pit that surrounded the volcanic cone.

Sobbing softly, Rita stumbled after him.

A wave of intense heat smote them like the breath of a furnace as they plunged through the arch. And a sluggish river of sparkling molten metal stopped Jerry Simonds in his tracks.

"God!" he shrieked, reeling backward, "The ether-ships! They've destroyed them."

Ridge had reached the girl's side in a single bound and she leaned weakly toward him as her brother shoved her roughly aside. Jerry Simonds was a man bereft of his senses. Yet he clung desperately to that loaded pack that was slung over his shoulder.

The two small ships were incandescent molten masses. Mere blobs of liquid metal that spread slowly as they sank, sending forth tiny sputtering rivulets to wander aimlessly over the floor of the mile-deep well within the great circular dam.

Behind them the surviving members of the crew streamed forth, backs bent under their precious loads. Screaming curses.

"We'll take it, men," Jerry was babbling, "Take the big ship. It's fueled and ready. Let's go."

Ridge pressed close behind him, trying to shield the girl with his own body. He had seen moving figures up there on the landing stage beside the main airlock of the *Mercurianic.* Frog men. Probably the ship was filled with Yrlds as well.

Kal Turjen yelled, and flame spat from his projector, searing the edge of the staging and bringing a frightful screech from a monstrous head which had appeared.

And then the green rays sped forth into the ranks of the outlaws. The platform was swarming with the basket-cradled Yrlds!

Jerry Simonds was pushing forward, shouting, his body aglow with the green energy and legs moving jerkily. His flame projector was spouting a steady stream. Some of the men threw down their packs and fought desperately against the paralyzing energy to reach the stairs. A karee was flung whistling and Ridge saw it drive deep into one of those bulbous heads.

The Yrlds were not invincible! Across his mind flashed the last words of Zarko—"It's iron that protects—steel." That was it—in their development of offensive and defensive weapons, the Yrlds had failed to take into account the properties of the metal so scarce in the mines of Japetus. They were vulnerable to weapons of iron and steel.

"Use your knives, men!" he yelled.

"Knives be damned!" Simonds screeched. "Flame—flame and bare hands. We'll get 'em!"

He staggered as he fought against the energy. The soft metal of the staging was dripping white molten streams. Many of the men were down. Ridge saw one of them shrivel like a trussed-up turkey and his body cover over with a glassy metallic green film. Those paralyzing rays meant death if prolonged. The pilot reached for the man's karee and thrust it in his own belt.

They were close by the great curving hull of the *Mercurianic* now, at the foot of the stairs. Still Jerry Simonds struggled upward. A glassy sheen was showing in the green glow that surrounded his body. And still he battled onward. Still he clung to the pack. Despite himself, Ridge thrilled to the fellow's courage.

And then he saw that Rita was no longer able to keep to her feet. Aglow in a dozen points with faint tufts of green, she slumped to her knees. Hardly able to move a muscle himself, he dragged her under the shelter of the great vessel's hull.

He saw Kal go down in a haze of green. His own eyes were dimming and he drew his body painfully to the girl's . . . at least they might be together . . . close . . . in that last moment. . . .

And then his groping fingers contacted with the steel hull of the *Mercurianic*. There was a brilliant flash of green. Release from the energy! Like closing a magnetic circuit, it was, or grounding a lightning flash. Free! Iron—steel—the rare metal of Japetus protects.

A sudden whirlwind of energy, he moved Rita and brought her arm in contact with the hull plates. She sat erect. Then, bellowing forth the astounding knowledge of the protection afforded by the steel hull, he rushed out and clawed at Kal's still body. Gripped anew by the rays, he heaved mightily with stiff joints. An inch only, at first—two, three inches—feet—and they were alongside the hull. Both were on their feet at the first contact with the welded plates.

"Jerry!" Rita sobbed, "He's down."

He was—a shriveled, green-glazed corpse there on the stairs.

"Keep her here, Kal," Ridge growled, diving for the stairs.

He saw that all of the outlaws were down. Corpses all; green cinders beside their packs of loot. Poor, greedy devils! A leering Yrld face was thrust toward him and he drove the karee home.

He saw an iron bar from the ship's stores, leaning against the white metal rail of the stage. Struggling desperately against new energy blasts, he clutched it with cramped fingers. Swung it crashing amongst the basket-cradled heads there on the stage as the touch of the cold iron renewed his strength. The rest was a nightmare. Bloodlust was upon him and he cleared the landing stage of the leering beasts of the ancient brains without pausing for breath until the thing was done.

Kal was coming up the stairs with Rita, dragging her gently past the hideous thing that had been her brother. Others of the Yrlds, hundreds of them, were drifting across from the archway toward them.

Ridge flung his iron bar down amongst them and reached trembling arms for the girl. The glorious golden head was buried on his shoulder.

They were in the airlock then, and Kal was bolting the outer seal. A few frightened, goggled-eyed frog men backed away as they went in through the passage to the navigating cabin. No Yrlds were within.

"Can we run this ship alone?" Ridge asked the Martian when he had led the white-lipped, staring girl to the captain's leather couch.

"Alone?" Kal Turjen chuckled. "I'll lay a bet I've got a crew of fifty frog men down below. And I can make 'em work as well as Bzor can. Watch me! Besides, they'll be useful in backing up our story when we return the ship to her owners."

On the last word he was gone.

Ridge looked over at Rita Simonds. She had turned her head to the wall and was lying there rigid, silent. Alone with her grief.

He tiptoed to the control panel. Looking down through the floor ports, he could see the drifting baskets of the Yrlds moving aimlessly about on the pit bottom. Bzor was there, great saucer eyes staring up malevolently. Iron that protects—steel. Ridge repeated softly the words of Zarko. The murderous Venerian had saved them, after all.

Then came the purring of the gravity-flux generators, a smoothly rising note that sounded as a harbinger of Kal's success.

The optophone shrilled its call and the Martian's squinting eyes looked out from the disc through the smoke of a cigaret that dangled at a precarious angle from his lower lip. His supply of these renewed, he was as comfortably at home as if nothing had happened.

"What did I tell you?" he gloated, "These froggies are okay." He held up a wriggling, staring specimen for inspection. The frog man blinked in friendly fashion. Harmless, but useful creatures.

Ridge laughed, and more than ever appreciated his friend's infectious good cheer. "Great work!" he sang out. "Step lively now—we're off!" The disc went blank as the pilot dived to the controls.

With the anti-gravity energy lifting them, they drifted up out of the huge pit. In the ages past, the frog men had built that great circular wall to hold back the dark waters from the retreat of their masters. Without the cofferdam the Yreds would perish miserably.

Inspiration came to the young pilot as they hovered at the rim. He saw the tiny white spots there by the cone, drifting aimlessly. Bzor, he knew, still ruled—a ghastly menace to civilization. If he and the rest of his ilk lived on, there was no assurance. . . . Ridge pressed suddenly on the keel rocket control keys.

Ordinarily, when leaving an inhabited body, the mighty energy of the rocket blasts must be withheld until many miles from the surface. For this reason the etherships are supplied with the slower gravity-flux. But here the destructive effect might be useful. It was.

The ship flung violently upward with the thunderous roar that came. And, before the cloud layer closed in around her, Ridge saw the huge wall of masonry collapse. Slowly, but eagerly; whipped white by the tremendous commotion, the seas closed in over all.

Hopes of countless ages forever gone. The marvelous but warped intellects lost in the heaving waters. The menace to the inner planets removed by that single blast. But the frog folk, who could live either in water or out, remained. They would be vastly more content.

A little later, when the water-bound satellite was but a slender gleaming crescent against the star-studded void, Rita Simonds walked to the pilot's side. Steadfastly, Ridge kept his eyes to his instruments.

For a long time the golden head was bowed at the viewing port.

"It's better so, I guess," she whispered, after a time, "I loved him, Ridge. My whole life was spent in fretting over him—looking after him. And now—"

"Now it's time you had someone to look after you." Ridge looked down into the tear-bright violet eyes.

"I—I suppose so, Ridge. I know so."

The shining head nestled in the hollow of his arm when she slipped into the seat at his side. And, together, they looked resolutely away from the gleaming crescent as the steering rockets purred and the great ship swung around and headed toward the great ringed orb of Saturn.

THE END

Invaders from the Infinite

By John W. Campbell Jr.

(*Continued from page* 229)

"Have you eaten? Then let us eat, and after supper we'll tell you what little there is to tell."

"But Arcot," said Morey slowly, "I understand that Dad will be here soon, so let us wait. And I have something of which I have not spoken to you as yet. Worked it out and made it on the back trip. Installed in the *Thought* with the *Banderlog's* controls. It is—well, will you look?—Fuller! Come see the new toy you designers are going to have to work on!"

They had all been depressed by the thought of their long absence, by the scenes of destruction they had witnessed so recently. They were beginning to feel better.

"Watch," Morey's thoughts concentrated. The *Thought* outside had been left on locked controls, but the apparatus Morey had installed responded to his thoughts from this distance.

Before them in the room appeared a cube that was obviously copper. It stayed there but a moment, gleaming brightly, then there was a snapping of energies about them—and it dropped to the floor, a fifty-pound lump of copper. It dropped to the floor but—it rang with the impact! Artificial matter is always soundless, for its atoms are fixed, and cannot vibrate in sound. Only natural matter can make sound.

"It was not created from the air," said Morey simply.

"And now," said Arcot, looking at it, "Man can do what never before was possible. From the nothingness of Space he can make anything.

"Man alone in this space is Creator and Destroyer.

"It is a high place.

"May he henceforth live up to it."

And he looked out toward the mighty star-lit hull that had destroyed a solar system—and could create another.

THE END.

The Ant with a Human Soul

By Bob Olsen

(*Continued from page* 263)

"That's O. K. with me, Kenneth dear."

After I had placed my signature on the dotted line of her sweet lips, Alice asked me a very significant question:

"What was the most important lesson you learned from your life among the ants?"

"It was the lesson of Religion, darling," I answered her.

"Religion?" she exclaimed. "Do you mean to tell me that ants have a religion?"

"They certainly have—and it's a very good religion, too. If mankind can ever be persuaded to unite and to adopt a universal religion, they couldn't find a better one than what I call Myrmacism, or Ant Religion. Its creed is one that ought to be accepted readily by people of every faith—Mohammedans or Buddhists, Jews or Christians, Protestants or Catholics. The keynote of this religion is simplicity itself. It is summed up in a single phrase, which may be used as a norm for guiding the conduct of any person under any circumstances."

"And what is that wonderful phrase?" asked Alice, her face beaming with eager expectation.

To which I replied: "Do whatsoever will bring the greatest amount of happiness to the largest number of people!"

THE END

Antipodal

Aspiring wings beat idly 'gainst the bars
  That hold in thrall—our feeble flutt'ring vain
  To match the stress, to snap the prison strain
That else denies our consort with the stars;
Where Luna lures or redly beckons Mars,
  Amoebic motes that glint in cosmic train,
  We chafe to scale the heights but ne'er attain
Beyond the sphere we tread as avatars.

Yet we are vast when we are viewed by that
  In orbits where the ultimate proton swings,
    Evolved alike from some unfathomed force;
God-like, inspiring awe, or marveled at
  As grovel serfs before the thrones of Kings;
    Thro' Time's abyss all run their destined course.

By Clio Harper.

The Hole that Grew

By E. D. Johnson

SMALL, apparently insignificant occurrences are often fraught with dire destruction or tremendous danger, but the man who foresees impending trouble is called a pessimistic fool, and must therefore do what he can to aid and fortify a situation as secretly as possible. Although secrecy is often helpful—sometimes it does delay an effective solution—as it did in this story. You will like this thrilling tale by Mr. Johnson, an author new to our columns.

Illustrated by MOREY

"THE Hole continues to grow," said Pritchard quietly.

The simple words sent a shiver down my spine and for a moment the 500-miles-an-hour speed of the express rocket plane through the stratosphere seemed all too slow. Then I reminded myself that in the scant four hours it would take us to fly from Chicago to San Francisco that ominous menace which we called simply "The Hole" could make little progress in its grim self-destruction.

The chief spoke again, bringing my mind back to our task. He was as unflurried as though engaged in the most routine laboratory experiment—and had been, ever since that tense moment, only a few hours before, when in our private laboratory, high above the towers of New York, he answered the television call from the Head Scientist of the State Board of Scientific Research of California.

"Here, Gray," he took from his billfold a little pile of clippings, "are the newspaper reports of poor Beale's experience. Glance over these quickly, if you will, while I make sure that our stuff there is in order."

The plane normally accommodated twelve people but we were the only passengers. Even so there was none too much room for the equipment we had hurled into it after receiving that terrible cry for help. I picked up the clippings abstractedly, but my eyes turned toward the chief, rapidly checking over our supplies. Bulky as they seemed in the speeding plane, they were insignificant enough in view of the terrific problem they, and we, were called upon to solve.

Beside a leather covered steel case in which were our gamma quartz lenses and ray condensers stood a box containing almost a half gram of radium. Behind that was a portable trunk-file, a moving analytical laboratory, with opening shelves and compartments which disclosed beakers, tubes, alembics, quantities of standard chemicals. And, of course, the case upon case of records and notes, results of our long months' work on the single vital problem of the release of atomic energy.

The words brought me back with a start and I picked up the clippings, glancing through them hastily for details I might have missed.

"I blame myself very much," Pritchard spoke as I took up the clippings, "for not having read the papers more carefully the past few weeks. If we'd seen even that first one—either of us—we'd have guessed—"

It told of a lunatic—so the scareheads called him—a mad scientist of San Remy, an obscure little California town, who had declared the end of the world approaching—or rather, in more scientific terms, had stated that disintegration of matter had started at his laboratory and could not be stopped. To a scientist—and one who knew the truth—the flippant journalese account jarred horribly. The man was expertly ridiculed in every line of a supposedly serious account. He had applied first to the County Board of Science and since the head of that body, unlike most such appointees, held his post as a political plum, had been roughly treated and sent about his business. In growing despair, he had applied to the editor of a politically opposed paper, which sent a reporter to see the Hole—a curious, smooth-edged break in the upper part of the laboratory outside the town—a phenomenon which the ignorant reporter put down to some explosive or chemical action.

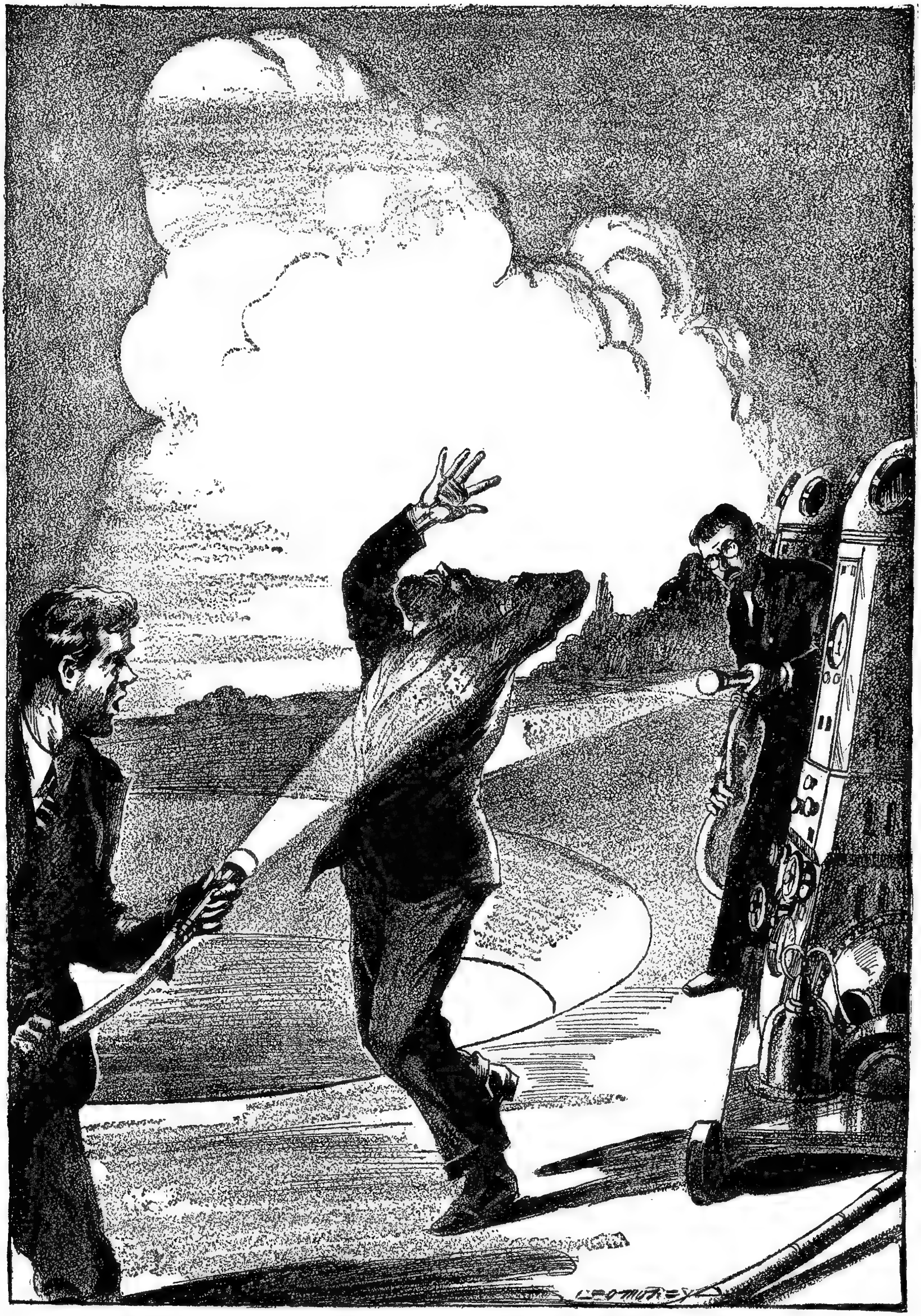
Clipping after clipping told the gruesome story. The man's reason had almost cracked from worry . . . he had been briefly confined, by well-meaning citizens, but fortunately not legally committed . . . he had broken away, tramped miles to San Francisco and somehow—desperate, unkempt, dishevelled—forced his way to the office of the State Board of Science and interviewed its chief.

And that very night—after a hurried flight to San Remy, and an inspection of the growing Hole, the laboratory and the scientist's notes of the experiments which had led to the terrible result—had come that televisionic call to Pritchard, the one man in America, if not in the world, whose knowledge and skill might yet avert wholesale disaster. Neither Pritchard nor I would soon forget the drawn, anxious face of that fine, white-haired old scientist as he appeared at the televisor and begged us to pack everything we had which dealt with atomic energy experiments, and come at once.

"And the Hole," repeated Pritchard, is still growing."

"It doesn't say so here," I pointed to the last clipping, still subtly jocose and unbelieving.

"It won't." When the chief's jaw set like that I knew he meant business. "I called Constable"—the San Francisco Chief Scientist—"back while you were arranging for the plane. He's agreed to seem to dismiss



"This is the end. Goodbye, Gray. . . . Letter in desk—hotel—good—"

the matter—he's already sent Beale back under escort. We're to arrive as friends of his—Beale's—get our stuff out there *sub rosa,* and work without attracting any more attention than we can help. How long we can keep it up, I don't know—but it's a ticklish business, Gray" (I smiled at the under-statement) "and the longer we can keep it to ourselves, the less chance for panic. Now—everything's in order, I think. Let's just run over these notes on the lambda ray—"

At San Francisco a local speed plane waited, engine roaring, and Constable, meeting us strictly incog, arranged to have our apparatus and files trucked to the country laboratory under cover of darkness that night. Landing at the little municipal San Remy field, we seemed two ordinary travelers and easily chartered a car to take us out to Beale's laboratory.

We reached there about ten, or rather, came as near it as a police cordon, drawn loosely around the outer edge of the grounds, would permit. Paying off our driver—who lost no time in hastily turning around over the stubbly field and speeding back to town—we stood a moment looking at the "two story building of natural stone" described in the newspapers. Although it stood at a little distance, on a rise of land, our eyes instantly caught the Hole—from where we stood, a missing upper segment, silhouetted against the sky.

But no jagged edges were outlined there, as with crumbling ruins or war-torn walls. The striking peculiarity of the edges instantly caught my eye. No physicist familiar with explosives would ever describe that hole as produced by one. Nor, I thought, would any intelligent man who had seen the jagged edges left after the passage of a projectile suppose for a moment that the Hole had such a cause. From where we stood, we could see that every edge of the solid stone was rounded as if it had been filed.

Pritchard and I stared silently, appalled by all that meant. Finally he said, "Gray, I want you to give me your word that under no circumstances will you go near or into that hole, or touch any part of the building near it."

"Agreed," I answered readily, knowing he had good reason for his caution. Later I was to realize the foresight which inspired the warning.

"We must find Beale," he said and we started for the building, meeting no objection until we approached the front door. Then a voice startled us.

"Here, you!" The officer detailed to guard the building appeared from a clump of bushes. "Where you goin'? Keep back there! No one's allowed up them steps."

"We want to see the man who lives here," said Pritchard. "We read about him in the paper and I think I know him."

"Yeah?" said the officer sceptically. "Well, my orders are not to let anyone go any further or talk to that man. And you're not goin' to do it, see?"

"But, officer," said Pritchard, "we are friends of Dr. Beale's."

"Well, maybe—"

Just then the door of the laboratory was thrown open and in the doorway stood a man whose very appearance was a shock. No wonder he had been thought a madman! Disheveled, wild-eyed, his hair entirely white, he looked an old man and a demented one, whereas we knew Beale to be forty-two or three, and one of the finest brains the country had ever produced.

"Pritchard!" he exclaimed, "And Gray too! Thank God you've come! It's all right, officer. Come in, won't you? Yes, officer—don't stop them! For God's sake, hurry, Pritchard. Tell him—"

It took a little persuasion, but soon we were seated around the table in the comfortable living room. Beale's apartment occupied the ground floor, the laboratories all being upstairs. It was curious to note the lounging chairs, the soft rugs and delightful furnishings—and yet all the time to be conscious of that menacing Hole closely, insidiously growing, eating away solid stone . . . upstairs, over our very heads.

"Why didn't you come sooner?" demanded Beale.

"Why didn't you send for us?" countered Pritchard. Evidently he and this man had long known of their mutual interest in the problem of atomic energy.

Beale smiled bitterly.

"Did anyone ever think you crazy? If so, you'd know how impossible it is to get anything done. I did file a dispatch, but I guess the telegraph operator 'humored' me—and then never sent the wire I addressed to you long ago. I thought perhaps . . . you were working on the same thing, and I got there first—"

Pritchard frowned and exclaimed, "Beale! You know better than that!" But with a quick gesture he checked my indignant defense of him against the undeserved suggestion of jealousy.

Beale smiled again wearily.

"Yes. Now I see you, I know better. But perhaps what they thought is true, to some extent. I have been half-crazy. Pritchard, this thing has got me. How in God's name am I to stop what I have started? You—of course, you've guessed . . ." his voice broke. The man was evidently on the verge of a breakdown.

"You've released atomic energy," answered Pritchard evenly, and I noticed that the calm statement of this incredible fact seemed, strangely, to soothe the man. "There's no use pretending that stopping its action is going to be easy. I confess I don't see how to do it—yet. But you'll be glad to hear that Gray and I have just finished a series of experiments on lambda rays which gave us our first clue as to how to unlock atomic energy. You have progressed further. Suppose we get your notes, and we'll see if, together, we can work something out. That's what we came for."

"Lambda rays?" Suddenly Beale was the scientist again—cool, alert, poised. The calm reception of his news and the counter-suggestion of a method he had not found, restored him to balance like a challenge. "My experiments have been along lines of low frequency ether vibrations, in conjunction with extreme heat. I'll get my notes."

As he hurried from the room, Pritchard's eyes met mine.

"It's better than I feared—and worse," he remarked quietly. Beale can help—will help. His mind is saved—we'll have to spare him without his knowing it—but that is something I had hardly hoped for. . . .

"The hole, though—" and into his quiet voice crept the note of intense seriousness, "That is—worse. Calculate for yourself, Gray. That first report was dated only—"

He caught himself up. Hurrying footsteps announced Beale's return and as he came in, flushed, disheveled still in appearance, but coherent and controlled, we knew that indeed the scientific spirit had asserted itself again over human nature and terror.

I SHALL not describe in detail the marvelous series of experiments Beale had made. Suffice it to say that an exceptional mind had charted the course and rare technical skill was shown in every experiment. To understand the difficulties of the task which confronted us, it is necessary for the reader to understand a little of the process that led up to the terrible situation in which we found ourselves.

As the reader doubtless knows, all matter is composed of atoms—those infinitesimal particles which build up a visible mass of lead, iron, silver or whatever the element may be. Until the discovery in 1898 of radium, it was supposed that atoms were the smallest particles existing in our portion of the universe. Any layman can imagine the interest—the excitement—with which the scientific world received the following discoveries:

1. Radium is an element which emits three types of rays (called alpha, beta and gamma to distinguish them), and gives these off continuously and without stimulation.
2. The beta rays consist of a *stream of negatively charged particles*, emitted with a velocity which is almost as great as that of light.

There were further discoveries which do not concern this present discussion. The important point is that what was supposed to be the smallest particle of matter was proved not to be the smallest.

We need not trace the marvelous series of experiments and the equally difficult and abstruse reasoning which led scientists to the inescapable conclusion that atoms are in turn composed of electrons and protons. Anyone who wishes to follow the details of these steps would do well to consult Irving Langmuir's articles in the Journal of the American Chemical Society, 1921.

To summarize, each atom is composed of one (or more) positively charged particle, called a proton, which has revolving around it at incredible velocity several negatively charged particles called electrons—the difference between any two elements is caused by the difference in the number of electrons and protons to the atom. In other words, each atom of silver—or hydrogen—or copper, or helium or carbon—is an infinitely small reflection of our solar system. Millions and countless millions of atoms are needed to make up a dime. And each of these countless million atoms contains a vast energy.

When in 1975 it became obvious that the coal supply would soon be exhausted, the necessity for unlocking this vast store of sub-atomic energy became evident. The task has been a difficult one. Atoms have resisted, during the formation of our world, heat and pressure beyond our power to produce, and doubtless vast electrical energies have been brought to bear upon them.

The reader can readily see how the scientist who found the first key to this knotty problem would win unquestioning support or jealous antagonism from his fellow workers.

Beale, then, had managed to release the electrons and protons within the atoms without being able to harness them. These were rushing off into space, each disintegrating atom affecting its neighbor. Thus the destruction proceeded as waves grow from a pebble dropped into the water. Where a part of the building had been there was now nothing—and this disintegration was continuing in wider circles each day. Beale had been powerless to stop it—and while the actual existence of the world hung in the balance, we discovered that we, too, had no knowledge that would arrest this horror.

That day—the next—the next—Pritchard, Beale and I worked at the problem until sleep overcame us where we sat, and woke to return to work again. Our equipment had arrived; we lived, ate and slept with our agonizing problem. Luckily the corner of the building which was slowly disintegrating did not cover Beale's delicate and valuable apparatus. This was in another room, but, of course, that too in time would go.

A week of intensive work went by. The hole was larger by a foot in every direction. By the end of another week, the rate seemed to have increased—each morning a change in size was noticeable.

Then came panic. We three had been so occupied with our tremendous problem that we had forgotten the outside world. Our first hint came when we saw a small crowd, quiet, yet somehow ominous, standing outside, gazing at the hole. I spoke to the officer who was still on duty outside.

"Well, Dr. Gray," he answered, his manner now very respectful, "I can't make them go away. Truth is they're most of them scairt half crazy. Can't say I blame 'em much. That there hole is sure queer. It gives me the creeps."

"Have you a morning paper?" I asked.

"Sure," he answered, taking a copy of the Tele-Tabloid from his hip pocket. "I'll bring you one every day, if you'd like. It's a bad business, and no mistake."

When I glanced at the screaming headlines, I knew that he spoke the truth. The alarm had been spread broadcast—all over the country, people were reading with a start of fear or a smile of tolerant amusement, "The World Is Disintegrating"; "San Remy Maniac Right"; or any one of half a dozen scareheads.

Now we, fighting in our lonely laboratory on that California hillside, were definitely affected by this mob hysteria. Our work was rendered more difficult by the crowds who came to see the laboratory and the rapidly growing hole. A morbid curiosity seemed to drive them—and after a day or two it was necessary for the local authorities to wire for the militia to insure the quiet and privacy we needed. Our telephone had long since been disconnected. Our supplies were smuggled in at night—and had to be searched for notes, religious outbursts, even infernal machines from the unbalanced who blamed us for the terror.

And still the hole grew. Grew daily faster—grew at the alarming rate of six inches in twenty-four hours. The entire end of the building had gone and the hole reached the ground. The day that was discovered a low murmur of horror rose from the watchers. It was the first visible demonstration that the earth itself was surely, irrevocably going. That shallow trough seemed more deadly a portent, somehow, than the dissolution of the whole side of the building. We were racing against time indeed.

ONE clear, still morning a week later, when in our little corner of the doomed world we were engrossed in a long and delicate experiment, a great commotion outside the building interrupted us. The militia were evidently having some trouble, and Pritchard, who had an uncanny faculty for dealing with difficult people, hurried out to see if he could help.

The crowd was pressing close as crowds will when curious. In the front line a tall, thin woman was struggling with the guards, who had great trouble to hold her. As Pritchard emerged from the laboratory she broke from them and rushed over to the hole.

Pritchard shouted to her, but she ignored him, dodged a guard who lunged after her, and hurried on. The crowd surged forward. Holding them back, guarding the many, the soldiers were unable to follow this one headstrong woman. Pritchard started forward—toward the hole he had forbidden us to approach—but the woman was too far away from him. In a moment she had reached it, that terrible yawning hole. We who were standing at the laboratory windows watched with a shock of horror.

Into that awful trench she stepped and picked up a double handful of earth. Pritchard stopped—no point now in risking his own life! I think that then only he, Beale and myself understood the dreadful doom which this unfortunate woman brought on herself. There was no immediate visible harm. But—we knew that a flatiron, thrown into that hole by way of experiment, had completely disintegrated in three days! We knew that even at that moment the atoms comprising the outer layer of skin on her hands were breaking up, and that they would then affect the next layer of atoms, and so on. She was doomed, doomed! But the gaunt woman stood there laughing in triumph, and oh, the pitiful irony of that laugh!

"Look, Margery!" she called. "Look? There's nothing to be afraid of! I told you this was all a fake."

A woman in the front rank of the crowd burst into happy sobs.

"Oh, Agnes—thank God, you're all right! It *is* a fake! Come back, my dear, come back!" And the first woman turned calmly to rejoin the other.

Then Pritchard did the bravest thing I ever saw done—and I was present at the Manila earthquake and the New York flood, where many men showed that bravery was not the prerogative of our ancestors. Beale and I cried out in protest as we saw him start toward that fatal spot, but he ignored us as the woman had ignored him. As he went he pulled on a pair of castage gloves he had been wearing in the laboratory to protect his hands from the dangerous lambda rays. To the edge of the Hole he stepped and began to talk to the woman, who, after a first start of horror, stood white but calm, listening. What he said we never knew, as he was too far away for us to hear and would not speak of it afterwards.

At this point I found trouble on my own hands. Beale, who had been watching, trembling and tense, suddenly broke down completely and turned away, sobbing like a woman. I turned to support and calm him and so saw nothing for the next two or three moments. By the time Beale pulled himself together and we again looked from the window, Pritchard and the woman were still standing by the hole. But she was carefully dusting off her hands and I could see that in some way he had carried conviction to her. Even at that distance we began to perceive her strength of character and courage. There was now nothing in the least hysterical about her—nor indeed had her manner been anything but collected all along. Her impulsive, excited struggle with the police and her fateful dash into the hole were caused, we discovered later, by a mistaken but solicitous attempt to convince a nervous sister that her fears were ungrounded.

Evidently directed by Pritchard, the woman (all the world now knows her name as Agnes Staunton) stepped out of the hole and took three long steps away. He walked beside her. Then both stopped and Miss Staunton stepped out of her shoes. Pritchard stooped and removed his, throwing both pairs into the hole. Then he carefully stripped off his castage gloves and tossed them in too. Meanwhile Miss Staunton had been standing perfectly still, with her hands held away from her. she watched Pritchard curiously but with an air of resignation.

"My God," whispered Beale, "do you realize that anything her hands touch will begin to break up? How are we going to manage this problem? We can't let her get away—yet we are lost if we go too near her!"

As they walked toward the laboratory, Pritchard called to me.

"Gray! Drop down another pair of gloves, will you?"

Quickly I got them and threw them to him. Miss Staunton took them by the cuffs, being careful not to touch Pritchard's hands. She pulled them on with a look of such utter despair as I hope never to see again on a human face. But she said nothing, and the pair came into the laboratory.

"Beale," said Prichard, "I don't need to tell you and Gray what Miss Staunton is facing. She has consented to confine herself in that small room downstairs."

And so it was arranged. Miss Staunton lived her brief time in that little corner room, never leaving it and subsisting entirely on the readily prepared foods we used.

At first the progress of her trouble was slow. It had been so with the preliminary destruction of the upper floor of the laboratory. Each day she changed her gloves, lest the old pair should tear and she would spread this horrible—I almost said, contagion. It seemed, indeed, like some ghastly leprous infection. I can never tell the sick pity and horror I felt when I saw at the end of a week that her fingers were gone to the first point and a portion of the flesh of the palms had disappeared. But my pity was matched with admiration, for not a groan or a complaint escaped her. Much of the time there was no pain—physical, that is. What her thoughts must have been, we only could guess. But when the end of a sensory nerve was attacked then the suffering was excruciating.

Hard as we had worked before, this experience seemed to call out some deeper strength in us all. Our endurance was incredible—day after day, Beale, Pritchard and I worked feverishly, almost wordlessly, hardly stopping for food or sleep. The long, tedious experiments seemed interminable—we could not afford to make a mistake and have to repeat any of them. Always before us we had the dwindling structure, the horrible example of that dying woman. Outside, the constant mutter of the crowd was changing and fanned a sinister undercurrent to our work.

About a week after Miss Staunton's fearful experience, we were working with intense concentration on the last of a series of experiments when the evening papers were slipped under the door. The news was startling indeed. Riots had occurred in many cities—riots of pure panic, caused by definite confirmation of the rumored news of Miss Staunton's fate. Some daring reporter, slipping up to a window, had seen her painfully manipulating her breakfast dishes with those crippled hands, and his description carried conviction as nothing else had. To bolster his story, pictures were shown of the laboratory "before and after," and needless to say, they caught the empty, disintegrating side from the view most calculated to enlarge and exaggerate it.

Added to that was the statement of a German scientist, based on abstruse, but, we had to admit, accurate calculations, which showed that the rate of disintegration would increase by geometric proportion and gave in cold figures the length of time it would be before the county, state and continent were wiped out and the rest of the world would follow.

We realized that now the truth was generally believed. People faced, in their own time, the end of the world. The effect was profound, but one which any good psychologist would have predicted.

EVERYWRERE, in all classes, there was a lavish expenditure of money. Savings banks were emptied—luxuries sold faster than they could be made, for workers stopped and took to spending, too. What good would money be after a little while? Religious revivals were widespread and the most fanatic sects drew the largest attendance. But there were only local outbursts of remorse or fear. The worst result of the suspense in which people dwelt was the loosening of the moral fibre. Crimes of violence, drunkenness and immorality became usual among all classes. Why not? Tomorrow—or next week—they said, we die.

In Philadelphia, drunken orgies were reported and a large portion of the city was in flames. The telephotos showed a veritable holocaust. Most disquieting of all was the news that a sort of Coxey's Army had started from Los Angeles to see the hole and to "throw the scientists into it." We could not have a crowd of people touching that danger spot and rushing away to spread the contagion! We could never hope to save our world—and how dear it seemed now!—if that terrible disintegration were spread broadcast by each footstep of a mob! Pritchard instantly sent a messenger to wire the governor for a stronger guard.

And during this time of national hysteria and demoralization, to which the world afterwards looked back with horror, Pritchard worked coolly, quietly, ignoring it all. But, insensibly, I relaxed my efforts and within myself determined that all our efforts were useless.

Then, at the very moment of acknowledged defeat, came that first shout of joy from Beale, unconscious of my thoughts. I could not believe my ears—nor, at the risk of being accused of being psychic, did the cloud of depression lift. I felt in my heart no hope—but at his cry, "I have it! Saved! Oh, thank God!" Pritchard rushed in, his face betraying a joy that was frightening.

"Are you sure?" he demanded. "Does it *prove?* Are you sure?"

"Well—" Beale the scientist was speaking; gone was Beale the enthusiast. "I'm as nearly sure as anyone can be until the trouble outside is stopped."

"Then," said Pritchard, "Let's risk it! We'll bring in a partly disintegrated brick and see what happens."

I can never be too thankful that I stopped his eager, self-sacrificing rush for the door.

"No!" I cut in, "If Beale is right, o. k.! But think, Pritchard! This is the best equipped laboratory in the country for this work—the only one. We'd start that destruction here—"

Pritchard stopped. He was like a child halted in some cherished plan. But his own good sense instantly won the day.

"Right!" he exclaimed. "I know Beale— and I don't think he makes mistakes. But we'll try this method on the building wall. Half the north end is gone and we shan't be able to work here much longer in any case."

Then together Pritchard and I carefully checked the data of the experiments. Yes, even my doubts seemed put to rest—we could hope, and perhaps believe. There was a chance—more than that, a good chance.

"Wait till the crowd's thinned out," said Pritchard. "We don't want to be mobbed before we start."

Beale reluctantly agreed. "After dark, hm? You're right—less danger of interference."

"Better yet," said Pritchard, "we'll have the crowd sent away by then. The militia can push back the line or close the road altogether."

So just after the nine o'clock change of guard, we carried outside Beale's notes, our Bethune ray condensers and our iota-ray generator. The lambda rays gave off a most eerie pale green light and our remaining spectators—mostly police and a few privileged citizens—were obviously startled as the condensers were turned on and the entire apparatus focused on the wall of the laboratory. Once the equipment was set up there was little more we could do. But we stood there fascinated, alternating between fear and hope. In the weird light, the half-ruined building seemed awe-inspiring indeed, the ominous trench beside it deep and uncanny. We watched until one o'clock, when we were all convinced—or had convinced each other—that the destruction was allayed. The flickering green light, the silence and the concentrated watchfulness has a strange hypnotic effect. Stronger than Beale or I, Pritchard finally forced us to leave the place and to retire. I cannot answer for the others, but I slept fitfully in spite of a powerful sleeping draught.

I woke, however, somewhat rested, and seeing the first faint light, hastily jumped out of bed. Sounds of movement told me the others were aroused. I dressed with frantic haste—what would we find . . . could we hope . . . ? I wanted to be first out of the building and on the ground.

Perhaps I have not said that the living room and laboratory were in the center of the building, one above the other. My bedroom was to the south of the living room—the opposite way from the Hole. I opened my room door, therefore, preparing to cross a little hall and go either into the living room, or, better yet, out on the grounds, to witness the result of our experiment in arresting the slow, inexorable dissolution of the solid walls and earth.

I flung open my door gaily, whistling a little under my breath in anticipation of the great moment when I should hail our success—and stood rooted in horror, the foolish tune dying away on my lips. From hope to despair is a long journey, but I took it quickly. For before my eyes was a sight that told of worse to come. At the top of the living room wall, near the ceiling, was a small hole—and *as I watched, it grew.* Near the ceiling—right where the condenser was focused—

We had not arrested dissolution—we had speeded it up!

How was I to tell Beale and Pritchard? That was my second thought, if not my first. I shrank from the task with sick horror—and just then heard in the hall the quick gasp which told me they had come in and had seen for themselves. They knew that instead of stopping destruction, Beale's apparatus had hastened it. The apparent gain of last evening was more than lost. We stood silently before the awful realization.

And before our eyes, the hole in the living room wall slowly but very surely enlarged minute by minute.

Pritchard was, as usual, first to recover from the shock of the catastrophe. He took charge like a general on a battlefield, rallying his all-but-defeated troops. At his words, Beale and I pulled ourselves up sharply. At least, I thought, we would go down fighting!

"Beale Gray—we can work here only a few hours longer—we must plan the next steps at once. Gray, will you please see to gathering our records and getting them safely out of here? We'll find a place outside San Remy—I understand the small lab there is hopelessly out of date—and get some new apparatus by plane express. Beale, you equipped this laboratory—you take charge of the necessary work at San Remy. Telephone for needed equipment, and above all work fast! Not a word about this acceleration to even the guards—make some excuse—but *move!*"

Mechanically I started for the laboratory, then stopped.

"All right, Pritchard," I answered, "but how about Miss Staunton?"

In the hall, gradually growing lighter as the sun rose, we faced each other and I saw the chief's jaw set grimly.

"She stays here," said Pritchard evenly. "Hard, I know—but we have no right to consider her as against our quicker success. At a time like this, the individual is—nothing!"

At our right a door opened. Miss Staunton stood there, the remnants of her hands still glove-covered. She did not join us, but spoke from the open doorway and actually smiled. When she spoke, one might have thought a mother was sending a group of children on a picnic, so sensible, so unruffled was her voice.

"You are entirely right, Dr. Pritchard. I heard what you said and I wouldn't have you do anything else. What good would it do just to move me to another room? I am a doomed woman. Even if you find the way to stop this horror, you cannot restore my hands to me. You must go—go quickly. Forget me entirely—think only of your work. But—may I ask a favor from you?"

"Anything!" Beale and I spoke together. Pritchard smiled a little, but nodded slowly.

"Before you go and leave me alone, place a quick-acting poison where I can get at it—something not hard to pick up—my hands are nearly gone." Here she stripped off her gloves and we all averted our eyes from the horror exposed. "Soon I must die of starvation and thirst, or risk contaminating others who feed me. . . . Won't you give me the means of quick release? The responsibility is mine, not yours."

This was a decision, indeed. Whatever she might say, the responsibility was ours—but what else could we do? If we left her, she would die by torture of thirst and hunger, with the further danger that she might become irrational and run away and spread contamination. Soon the gloves would not cover the affected flesh and then bedclothes, furniture, everything, would be subject to that fearful plague. True, there was grave doubt that we would ever succeed after this disheartening setback—but in that case, everyone would die, and die horribly. Every moment mattered if we were to grasp the slim chance that remained. Our decision has been the subject of bitter denunciation, but I do not see that we could have done anything else. We gave her a beaker full of solution of cyanide of potassium, and a glass tube through which she could suck. And she smiled her gratitude.

Then, jumping into his dusty little car, Beale drove off furiously toward San Remy, while Pritchard and I settled down to our task of packing and carting movables out onto the grounds. Of no avail our silence! Our actions spoke for themselves, that and the ever-growing ominous hole. First the watchers knew, then word was flashed around the world that we were forced to move. Reporters tried to talk to us, messengers drove up with telegrams offering us money, services, equipment—anything we might need. But we waved them all aside. Now it was a question not of days, but of hours—of minutes, even. On some small delay, the whole fate of the world might hinge. I cannot even remember what we did, save that by night, when the end wall had gone and the laboratory was exposed to the open air, we were ready to truck our few clothes and our books and precious equipment to San Remy.

ON our way through the hall with the last load, Pritchard and I stopped by commen consent outside Miss Staunton's door. We must not leave without a word—yet what was there we could say? We knocked. No response. In a moment, Pritchard drew on a pair of gloves and gently turned the knob. The door was not locked—he pushed it open. Miss Staunton lay on the bed smiling as if in sleep—we knew she would never wake from that sleep. On the wall over the couch the words were scrawled—"Goodbye and thank you. God grant you quick success."

Pritchard closed the door. In silence he drew off his gloves and dropped them where he stood. Then, after a sigh, he said, "Come, Gray!" and led the way to the waiting truck. Saddened as we were by that brief farewell, the sight outdoors turned our thoughts instantly to the present—and the future.

The hole gaped twenty vacant feet into the earth by now; we had to skirt it carefully to gain the road. Hurriedly bundling into the car, we started, but I could not forget that empty space, implacably eating away our solid earth. I wondered how long it would be before enough disintegrated to affect the rate of rotation of the world. Then one side would have longer and longer days until finally the earth would cease to rotate and one-half the world was condemned to unbroken day and heat, the other to eternal night and cold. Eternal—until one day the frightened inhabitants, huddled together, saw the edges of the ever-growing void advancing steadily, slowly, toward them . . . would life outlive the world, and mankind and animals be thrown off into the air . . . ? No, my mind refused to grasp it. I could not imagine those last days.

None of us had realized how panic-stricken the neighborhood had become. San Remy had been a quiet suburban city of small houses and gardens. The usual small country hotel had harbored its occasional transient visitors. After dark a light would show in every house, in living room or porch, and an evening drive through the straggling town would show many glimpses of contented family groups. But now the houses were dark, the streets deserted. The only activity centered at the hotel, which did a rushing business. We had planned to meet Beale there and found him in the lobby. Luckily we were not recognized and he quickly warned us not to mention names.

As soon as we were outside, he said, "I've been warding off reporters and hysterics until an hour or so ago. Then I located a lab, and the crowd settled down to watch it. The town's pretty much deserted, except for a reserve guard of militia and these people here. Captain Ecker's placed a guard around the lab and the nearest house, where we'll stay. I slipped away without being seen and the mob still thinks I'm here."

"How about equipment?" asked Pritchard.

"Be here by dawn tomorrow, and installed by night. The companies responded splendidly. I phoned St. Louis and Denver this morning, and the apparatus started by plane express within an hour. They called me back to tell me and to say they had sent duplicate sets by separate planes in case of accident. Now the question is—how can we get into the new place without being seen? The mob's distinctly hostile—they blame us for making things worse instead of better—and we can't afford a scrimmage."

Thanks to the militia, we donned borrowed uniforms and so slipped into the new house safely. They had thrown a cordon around it and the laboratory, the private structure of a scientifically-minded multimillionaire who had moved out in double quick time and left everything in perfect order for us; the house had been his plaything, but was large enough to suit us exactly. Here we got our stuff unpacked and sorted and our smaller movable apparatus ready. True to plan, the huge new cases arrived next day and we worked like slaves getting the apparatus unpacked and assembled. The following morning we were at work again, having lost only two days' time.

And then came the day, when, hardly daring to hope, much less to believe, we three gaunt, hungry, unshaven men—exhausted by a long experiment which had to proceed unbroken—faced each other in the silence of a still California night and saw that salvation might be near. Beale began to tremble violently—I sat down abruptly, breathing as if I had run a race. Only Pritchard remained by the white-topped table, jotting down, in his firm, steady hand, a few final notes and comments. He turned with a little smile.

"It may work—and it may not," he said, as calmly as though he were trying a new cooking recipe. "But—we'll risk our lives doing it. Any objections?"

Beale jumped up as if stung.

"You're wasting time," he cried, his voice cracking from fatigue and excitement. "Come—we must start—*now!*"

Pritchard went to the window and raised a blind. In the early dawn, the world lay hushed and quiet. Yet beneath the window was the dark mass of men and women who now unceasingly watched our little building. Pritchard looked down on them pityingly—on the nearer ranks of soldiers, on distant tents and wagons and huddled forms of outdoor sleepers—evidence of the way the eyes of the world were on that tiny dot of light where the work went on, night and day, in the commandeered laboratory.

Then his hand lifted—and our eyes followed. Stark and sheer rose a solid wall—across fields and little hills we saw the rising sun strike its grim, smooth, omnious surface—the side of the hill where once Beale's laboratory had stood, the building now gone, and much of the land around it.

"We can't tackle *that*," said Pritchard calmly, "in any such state as *this!*" and he indicated us all in his gesture. "Sleep—first—for us all. I know what I'm saying," he spoke almost sharply at Beale's interruption. "If it fails, we're lost, in any case. We can do no more—we might as well jump in our hole. The whole world will follow. There's a chance we may succeed, but to do so we must all be at top form—rested, alert, *awake*. To bed, both of you. I'll decide when we start. Agreed?"

Needless to say, we agreed, and on waking, hours later, our heads were clearer, our minds more alert. On talking it over in sane daylight, we determined, in fact, not to try our new method until that night, and this time we must act without spectators. Moving slowly, under military guard, we left our laboratory at midnight and returned to the forsaken hillside. In a scant week, the hole had become an abyss—our ill-fated experiment must have enormously accelerated the rate of disintegration! Two hundred feet deep and a quarter of a mile in diameter spread the ominous gap, visibly enlarging each moment.

Feverishly we worked. . . . Now we were here, we must not lose a second. Pushed behind us was all thought of aught but what we were doing. For our experiments, we chose a small promontory which jutted out into the hole. First we timed the rate of disintegration, and found the earth was vanishing at the rate of six inches in eight minutes. Quickly we set up our lambda condensers and the new low frequency ether wave generator we had devised, and turned them conjointly on this chosen spot.

BEFORE our eyes, the dissolution went on . . . a moment . . . an age it seemed . . . then—had it stopped? Or were we only becoming used to the slow, steady retrogression of the edge? We waited, breathless—a curious, flashing, unearthly light flared out, seared the gaping sides of the abyss, sent tingling currents of a sensation absolutely impossible to describe up and down my spine, into each arm and finger. The apparatus I was holding quivered and almost tore away from me. I held it by main strength and the violent tingling seemed to burn through me like a thousand lightnings. Then—suddenly—silence, the light flickered down, the roaring in my ears died away—(though we were all partially deaf for days afterwards)—and I dared look at the others.

Their faces told the story. We had won!

As all the world knows, this was but the first step, and before we wrote "finis" to our work, the hole was to take its bitter revenge. But then we thought only of our victory and the work of constructing three giant sets with which, for days, we circled the hole, narrowing in toward the still deepening center. Now the militia was needed to keep back the jubilant crowds and to rescue us from delegations that insisted on making congratulatory speeches, being photographed by the sheer wall of the hill and presenting us with signed and engraved resolutions. We could not make them realize that our work was not done and that there was still danger. We were the only ones who could carry on the work, and by this time we were all exhausted.

The last straw was the discovery that at its very center the hole had touched some material more easily disintegrated, and there a pit ten feet deep and eight feet across ate its way down the straight side walls. With despair we saw that it would be impossible to reach the visibly retreating bottom without descending into the pit. Our condensers could not work at a greater distance than six feet.

Again Pritchard saved us from panic, proposing a brief adjournment and a rest.

Beale and I readily assented, knowing ourselves on the verge of complete breakdown. It must have been this utter physical exhaustion which numbed my mind. I have bitterly blamed myself for my stupidity; well as I knew Pritchard, I should have perceived what he meant to do.

I only vaguely remember leaving our apparatus ready, driving back in the closed car and flinging myself on a couch downstairs, not bothering to go to my room, though Beale went to his. Pritchard lay down on a long, cushioned bench across the room. I dropped instantly into the first really refreshing sleep I had had in months. I remember stretching languorously as I awoke, then jumping up—and the sudden start of surprise when, across the room, I saw that Pritchard's couch was empty.

Over me swept such a foreboding of disaster that for a long moment I stood frozen—then I gave a shout that brought Beale on the run. Together we drove full speed to the hole, no longer growing larger, God be thanked. Our fears were confirmed when we saw the little roadster near the edge. Pritchard was down in the pit, working his apparatus.

Beale and I called out to him with one breath. So convulsed was I with horror that I remember sitting down on the ground and taking off my shoes as though I would plunge in after a drowning man. Beale held me back as I would have jumped, and Pritchard brought me back to myself with a laugh. Yes—there was no use jumping in! He had been exposed to the fatal contamination, and we knew that the lambda rays would stop the earth from dissolving—but on human flesh . . . !

But I cried out in horror to ask why he had tricked us so.

'The danger was too great to delay," answered Pritchard, working even as he talked. "If the bottom of the pit went on disintegrating after he had stopped the top, don't you see the hole would undermine good earth and soon start spreading faster than we could follow it?"

"Yes—but why need you go in and risk—" I broke off, unable to name the fate which awaited him.

"I know what I risked," he answered. "Why should I be spared? Why shouldn't I go?"

He spoke as quietly, as modestly, as if he were not the greatest scientist living, and that had meant, these last few weeks, the greatest living man. All this time he had been working, turning his saving apparatus all around.

"There!" he exclaimed, "that completes the tenth exposure of each section. Three we considered enough, you know, but with this bad outbreak I wanted to be sure. Now," he continued, "you are to follow my instructions to the letter. Will you promise? I assure you it is necessary."

Heartbroken, almost wordless, we agreed.

"Then," said Pritchard, "throw me that rope over there and I'll climb out. When I'm out, I'll pull the rope up and you are to turn the apparatus on me—one on the front, another on the back of my body, and you are to play it over me slowly ten times at least. I have your promise and I hold you to this—*no matter what happens.* I know pretty well what will happen, but you must not touch me *until I give permission* . . . in whatever form my permission comes. You must not risk allowing this to start again. You understand what you are to do? Very well—let's start."

Beale and I brought the rope and while Pritchard climbed out we set up two sets of equipment and turned them on. Carrying the rope, Pritchard walked between them and smiled into my eyes. Slowly we brought the rays up from his feet . . . and as we reached the base of his spine, he said hastily:

"This is the end. Goodbye, Gray . . . Letter in desk—hotel—good——"

His whole body stiffened to rigidity, but so carefully had be balanced himself that he did not fall immediately, and Beale and I played our apparatus slowly up and slowly down ere he fell. I am not ashamed to confess that my vision was so blurred it was hard to see, as we turned our apparatus toward the ground and played it slowly over Pritchard's body eight times more. We started to turn it over and repeat the process when Beale said:

"He told us not to touch him till we got permission. . . ."

"But—" I began. Had he lost his reason? Pritchard, we knew, was dead.

"His letters," said Beale. "Perhaps we'd better read them first. I'll stand guard—he said he'd left them at the hotel—while you run the car into town and find them."

True to his word, Pritchard had left the letters at the desk in the little hotel—fearing, I suppose that if we discovered them after he left the laboratory we would lose time opening them before following him to the hole. One was to his wife, another to his son—the other, I give here:

San Remy, California,
July 17, 1992.

Dear Gray and Beale:

I know what's going to happen. I saw the effect of our new ray combination on a rabbit, when we were working on the hole. It's instantaneous and complete paralysis. I wish I could spare you this shock, but I cannot see any way to do it.

If you have obeyed instructions, you will read this after my death but before touching my body. Bury me where I fall, and do not touch me. Dig a small trench so close to the body that it will roll over and then play the apparatus on me and on the spade. Then and then only cover me with the dear mother earth we have fought so hard to save.

It has been an honor to work with you two men. To you goes all the credit for our final success.

P.

There is nothing more to tell. After permission from the authorities (and how the red tape irked us!) we followed Pritchard's instructions literally. There lies his grave, near the center of that vast, unfilled hole, whose surface is now covered with grass and gay small flowers.

What the world—and we—thought of his work contradicts that last generous sentence. For they call it Pritchard's hole, and preserve it, by public gift, beautifully landscaped, a simple but impressive reminder of how nearly we lost our earth and of the man whose skill and courage saved it to us all.

THE END.

Your Viewpoint

Charles L. Campbell and Taine's "Seeds of Life"

Editor, AMAZING STORIES QUARTERLY:

I was greatly interested by Mr. Charles L. Campbell's letter which led off your discussions column in the March issue—interested because, out of all the many assailable theories in the stories of the Fall Quarterly, he had to pick on one that *really was correct.*

In the story in question, Taine's "Seeds of Life," the offspring of a woman subjected to X-rays of extreme hardness is a reptile. Mr. Campbell says this is impossible, because the cause of evolution is "an impulse toward improvement . . . which (in man) renders every normal human being unsatisfied with present conditions." As impulses are not affected by X rays, Taine's plot is impossible, he concludes.

Now there are two factors in the modern explanation of evolution, and neither of them has any connection whatever with impulses or instincts.

1—Darwin was the first to clearly propound the principle of *Natural Selection.* Briefly stated, of a number of different individuals of a certain stock, those best fitted to survive in the prevailing environment are the most likely to live and to mate. Thus the offspring of these better equipped individuals will eventually be the only survivors.

This first factor is, by its nature, not susceptible of experimental proof, but its simple logic is unassailable.

But *Natural Selection* is only half the story. Why are there differences between individuals? The principle seems to lead inevitably to the conclusion that only the best of the original stock would perpetuate. Then all the offspring would be exactly alike; all would be the best of the original stock.

There is no such stagnation in the actual biological world. The amount of difference between individuals of a certain stock does not tend to diminish with the generations, but remains constant.

To explain this fact, a disturbing factor independent of *Natural Selection* must be present. For many years the identity of this disturbing factor was the great puzzle of biology, and, doubt as to its existence at all in actuality, the great objection to Darwinism.

Happily, this question has been solved to everybody's satisfaction, and not as recently as general ignorance of it would lead one to think.

2. The explanation is "*Mutation.*" To illustrate: A certain type of fly, bred in the laboratory in complete seclusion from all external disturbances, continues unchanged through thousands of generations. Then, suddenly, one of the offspring is a freak, having, say, a couple of legs more or less than normal, longer body, differently attached wings, or any other marked difference. This occurrence is a *Mutation,* or sudden change. Something in the mechanism of heredity has left the beaten path and entered new territory, and an individual *unlike any of its ancestors since the first living jelly* has been produced. Frequently, this individual, mating with the normal type, produces offspring that maintain the *mutation.* In other words, the *mutation* is not a superficial deformity, but has its seat deep in the mechanism of the germ plasm, the vehicle of heredity.

Now all is clear. If the *mutated* type is better suited to the environment than the normal, it will survive, and eventually completely replace the old type. If not suited, it will die out without a trace. But notice—the *mutation* itself is accidental—undirected. It can be any sort of a change; for the better or worse, of large or small extent. But *Natural Selection* eliminates the bad, and encourages the good *mutation.*

Now follows an important conclusion. Increase the number of *mutations,* and evolution is speeded up!

But is it possible to increase the number of *mutations?* Yes! Innumerable experiments have proven that. *Mutations* can be induced by mechanical means, such as sticking a needle into the unfertilized egg. They can be induced by drugs. But, best of all, they can be induced by subjecting the normal type to X-rays. All this is actual experimental fact.

Now let us examine the Taine story in this light. Taine gives instances of favorable and unfavorable *mutation.* Bork, the mechanic, is improved to the genius De Soto by subjection to X-rays of a certain type. But X-rays of a different type or "hardness" produce the unfavorable mutation to the reptile. As a matter of fact, what Taine has written about is not evolution, which involves *mutation* in *connection* with *natural selection* through many generations, but just *mutation* alone. As both De Soto and the reptile die, both are abortive as far as changing the race is concerned, and so do not affect evolution.

Mr. Campbell evidently thinks that Taine has written the usual type of science fiction story, in which science is sadly strained for the sake of originality in the fiction. On the contrary, Taine has stuck very close to actual, present-day scientific knowledge, merely exaggerating the *controllability* and the *extent of difference from normal* of the *mutations* which can undeniably be produced by X-rays. As his Xrays are of greater hardness, and his De Soto of greater intelligence than present-day equipment and scientists, this exaggeration is quite excusable.

Taine is an accomplished scientist, and in my opinion, the best science fiction writer of the time. After his "Seeds of Life," with its well thought-out plot, imaginative but accurate science, and flexible and powerful style, the remaining stories seemed trite.

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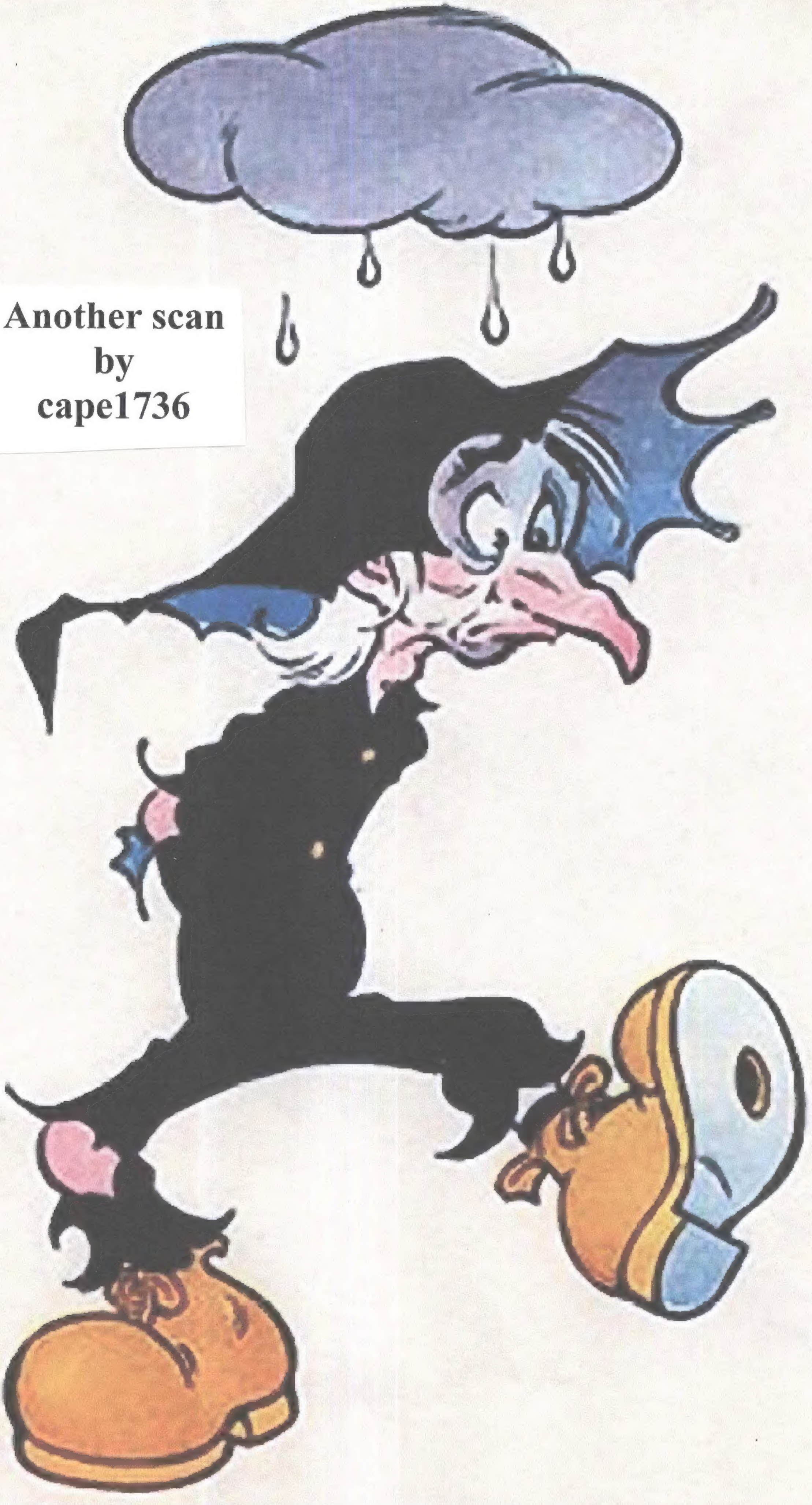

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